July 2021

Binder 146, Opecoelidae E-Ha [Trematoda Taxon Notebooks]

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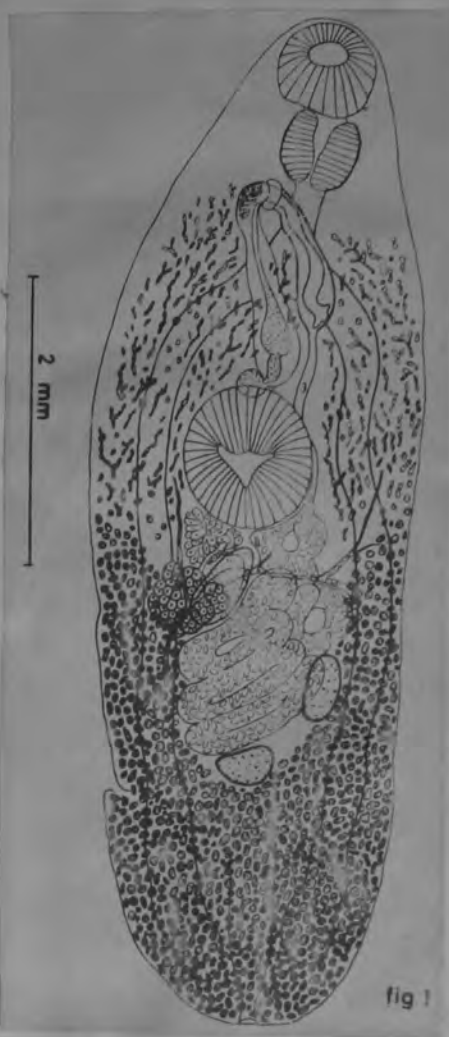
Emmettrema lariosi Caballero, 1946

Hamacreadium lariosi (Caballero, 1946) Yamaguti, 1953
(Figs. 1-3)

Huésped: *Lutjanus guttatus* "Huachinango" Fam. Lutjanidae.
Habitat: Intestino.
Localidad: Manzanillo, Col. México.
Número de ejemplares: 1.
Ejemplar depositado: Colección Helmintológica del Instituto de Biología de la Universidad Nacional Autónoma de México, con el N° 218-21.

Se colectó un solo ejemplar maduro en el intestino de *Lutjanus guttatus* llamado vulgarmente Huachinango, de Manzanillo, Col., se aplanó entre porta y cubreobjetos, se fijó en Bouin y se tiñó con paracarmín de Mayer.



DESCRIPCIÓN. Se trata de un parásito de cuerpo alargado, con los extremos redondeados, bastante grueso, mide de longitud total 7.025 mm. y de anchura máxima a nivel del acétabulo 3.261 mm. Cutícula gruesa y lisa. La ventosa oral es subterminal, voluminosa de gruesas paredes musculosas, más ancha que larga mide 0.516 mm. de largo por 0.646 mm. de ancho. El acetábulo es ligeramente preecuatorial voluminoso mucho más grande que la ventosa oral, de abertura transversal mide, 0.969 mm. de largo por 0.904 mm. de ancho. La relación de diámetros entre la ventosa oral y el acetábulo es 1:1.87 × 1:1.39. La boca se abre en medio de la ventosa oral mide 0.187 mm. de largo por 0.255 mm. de ancho. La prefaringe mide 0.056 mm. de largo, medida relativa por que el parásito está ligeramente contraído. La faringe musculosa más ancha que larga mide 0.428 mm. de largo por 0.484 mm. de ancho; se continúa con un esófago el cual mide 0.452 mm. de largo por 0.161 mm. de ancho.

Los ciegos intestinales recorren dorsalmente toda la longitud del cuerpo y terminan cercanos a la extremidad posterior a una distancia de 0.484 mm. estos son de bordes más o menos lisos y miden de ancho 0.209 mm., la bifurcación cecal tiene lugar a una distancia de 1.566 mm. de la región anterior.

Los testículos son pequeños situados más o menos en el tercio posterior del cuerpo, son postacetabulares, intercecales, postuterinos, postováricos, y oblicuos. El testículo anterior se encuentra situado sobre el lado izquierdo del cuerpo, de forma oval con bordes más o menos lisos, mide 0.452 mm. de largo por 0.242 mm. de ancho. El testículo posterior más o menos en la línea media, más ancho que largo, y más pequeño que el anterior mide 0.262 mm. de largo por 0.337 mm. de ancho.

Los conductos eferentes desembocan, independientemente uno del otro, en la extremidad distal de la bolsa del cirro, que presenta en este único ejemplar una anomalía, pues la vesícula seminal interna, se proyectó hacia fuera formando una hernia (probablemente cuando se fijó el parásito) dicha hernia es de forma más o menos esférica y se encuentra situada ligeramente por debajo del borde anterior del acetábulo, mide esta hernia 0.150 mm. de largo por 0.187 mm. de ancho.

Fig. 3. Dibujo del complejo reproductor de *Hamacreadium lariosi* (Caballero, 1946) Yamaguti, 1953.

La bolsa del cirro es claviforme, alargada, situada preacetabularmente, se encuentra más o menos en la línea media, mide 1.518 mm. de largo por 0.326 mm. de ancho; la región posterior se encuentra ocupada por la vesícula seminal que presenta dos porciones bien definidas: mide 0.726 mm. de largo por 0.206 mm. de ancho; la porción media está ocupada por el conducto eyaculador, largo, que se prolonga hasta el cirro, que ocupa la porción anterior de la bolsa; en esta misma porción se encuentran numerosas células que forman la glándula prostática.

El cirro es largo y se encuentra en este ejemplar evaginado dentro del metratermo en un acto de autofecundación; la bolsa del cirro termina en un atrio genital no muy bien definido que desemboca al poro genital único que se encuentra situado a la altura del esófago y sobre el lado derecho de la línea media.

El ovario es lobulado presenta nueve lobulaciones profundas, se encuentra situado sobre el ciego intestinal derecho, postacetabular, postecuatorial y pretesticularmente, mide 0.516 mm. de largo por 0.484 mm. de ancho. El ootipo se encuentra situado hacia arriba del ovario y a un lado del receptáculo seminal, la glándula de Mehlis se encuentra situada entre el borde anterior del ovario y el borde posterior del acetábulo; el receptáculo seminal de forma ovoide más largo que ancho, preuterino, se encuentra situado dorsal al ovario, mide .. 0.484 mm. de largo por 0.323 mm. de ancho. Canal de Laurer presente.

El útero es intercecal, pretesticular, ocupa una gran área entre el testículo posterior y el acetábulo, estando ligeramente superpuesto al testículo anterior encubriéndolo un poco; la rama ascendente recorre el lado derecho del acetábulo y sigue más o menos paralela a la bolsa del cirro, continuando de esa manera hasta que se ensancha a la altura de la mitad de la bolsa del cirro constituyendo el metratermo que presenta gruesas paredes musculares, éste mide, 0.659 mm. de largo por 0.177 mm. de ancho y termina en el atrio genital, esta porción terminal del metratermo es fuertemente musculosa presentando un grueso esfinter.

El poro genital de abertura transversal, ligeramente oblicuo de izquierda a derecha y de arriba abajo se encuentra a una distancia de la extremidad anterior de 1.292 mm. y en una posición a la altura del esófago ligeramente a la derecha de la línea media. Los huevecillos de cáscara amarillenta, son pequeños y operculados, miden de 0.086 a 0.090 mm. de largo por 0.041 a 0.045 mm. de ancho.

Las glándulas vitelógenas se extienden dorsalmente desde el nivel del esófago hasta la región posterior del cuerpo donde son muy abundantes, éstas en la región anterior son dendríticas. Ventralmente se extienden desde la altura del borde inferior del acetábulo hasta la región posterior del cuerpo donde son más abundantes y de formas ovoides o más o menos esféricas. Los viteloductos corren lateralmente, son dos anteriores y dos posteriores; el anterior y el posterior del lado derecho se unen a la altura del ovario y dorsalmente a éste forman un pequeño conducto que desemboca en el lado derecho del receptáculo vitelino; el anterior y el posterior del lado izquierdo se unen a la altura del receptáculo seminal y forman un solo conducto de trayectoria transversal que dorsalmente desemboca del lado izquierdo del receptáculo vitelino; está situado este pequeño receptáculo vitelino entre los dos ciegos intestinales, por debajo del acetábulo y se encuentra dorsalmente al receptáculo seminal, es más ancho que largo y está ligeramente a la derecha de la línea media, mide 0.075 mm. de largo por 0.300 mm. de ancho.

El poro excretor es terminal y medio, comunica con la vesícula excretora que es tubular, se encuentra situada dorsalmente entre los dos ciegos intestinales y asciende probablemente hasta la altura del borde inferior del acetábulo. (No fue posible observarla totalmente porque se encuentra enmascarada por los huevecillos y las vitelógenas.

Discusión. Este parásito corresponde a la especie *Hamacreadium lariosi* (Caballero, 1946) Yamaguti, 1953, descrita por el Dr. Caballero y encontrada en un "mero" pez no identificado, en el Puerto de Salina Cruz, Oaxaca, en el año de 1946 por el Dr. Ignacio Larios. Fue considerada por el Dr. Caballero como un nuevo género y nueva especie (*Emmetreme lariosi* pero que Yamaguti así como el Prof. Skrjabin consideran como sinónimo de Hamacreadium. La he identificado como *Hamacreadium lariosi* por coincidir la mayoría de sus estructuras, siendo más pequeño el ejemplar descrito en este trabajo que el descrito por el Dr. Caballero, la bolsa del cirro y el metratermo no se entrecruzan, no existen poros masculino y femenino, sino un atrio genital poco notable y el poro genital se encuentra a la altura del esófago inmediatamente por debajo de la faringe y algo a la derecha de la línea media. Diferencias poco notables en verdad debidas probablemente a la contracción del parásito en el momento de la fijación; se redescribe en este trabajo el mismo parásito con un nuevo huésped y una nueva localidad.

From Lamothe A., 1963

EMMETREMA Caballero, 1946

Allocreadiidae. Body oblong, rounded ends; cuticula smooth; oral sucker spherical, subterminal, smaller than acetabulum; prepharync present; pharynx rectangular; smaller than either sucker; esophagus muscular and long; intestinal ceca unbranched extending to posterior end. Sex pores at level of intestinal bifurcation; testes ovoid, intercecal, oblique, in posterior half of body; cirrus sac large and bowed, located along the acetabulum in form of a "botella", seminal vesicle pyriform and with a long ejaculatory duct; prostatic gland small and confined to the lateral parts of anterior end. Ovary with many deep lobes, intercecal, derecho, postacetabular and pretesticular; seminal receptacle large, ovoid, located at mid-ovary level; ootype preovarian; Mehlis gland large and preovarian: Laurer's canal present; uterus intercecal, from anterior border of posterior testis to posterior border of acetabulum; extending along right edge of acetabulum parallel to cirrus which it crosses as a metraterm which opens in a female pore. Eggs numerous, large, 84 to 91 by 46 to 53 μ. Vitellaria dorsal from level of intestinal bifurcation to posterior end; somewhat dendritic. Excretory pore dorsal and subterminal; excretory vesicle ovoid. Type species: E. lariosi Host: "mero", probably Epinephelidae.
Locality: Salina Cruz, Oaxaca; Pacific Coast of Mexico.

Compared with Allocreadium, Helicometra, and Hamacreadium # differing in "position of sex pores; extent and arrangement of uterus; location and structure of cirrus sac and metraterm; extent and shape of vitellaria; and form of eggs".
It is a little like Choanostoma

Similar to Phyllotrema
Yamaguti, 1934.
but lobed ovary
& median sex pores
also similar
to Holorchis

Fig. 1. Dibujo de una preparación total de *Emmetrema lariosi* n. g. n. sp. Región ventral.

Compare this with
Hamacreadium
brusadaensis
N.K. Gupta, 1956
(cap ut.)

Ref. An. Inst. Biol.
17:167-174.

EMMETREMA

Eocreadium Szidat, 1954

Generic diagnosis. — Allocreadiidae, Lepocreadiinae: Body spatulate, with rounded ends, unarmed. Oral sucker subterminal, larger than acetabulum. Prepharynx and esophagus short. Ceca reaching to near posterior extremity. Acetabulum rather small, pre-equatorial. Testes rounded, juxtaposed in middle third of body. Vesicula seminalis externa present. Cirrus pouch narrow, weakly developed, largely dorsal to acetabulum. Genital pore median, immediately in front of acetabulum. Ovary in front of right testis, usually trilobed. Seminal receptacle large, beside ovary. Vitelline follicles small, extending only lateral to ceca anteriorly but surrounding them from behind testes to posterior extremity, commencing at level of acetabulum or behind it. Uterus coiled in intercecal field between testes and acetabulum; eggs large, not very numerous. Excretory vesicle tubular, reaching testes. Parasitic in stomach of freshwater fishes.

Genotype: *E. intermedium* Szidat, 1954 (Pl. 105, Fig. 1269), in *Plecostomus commersoni;* Buenos Aires.

Diagnosis: Género **Eocreadium** n. g. Szidat, 1954

Eocreadium n. g. *Allocreadiinae* con cuerpo plano, lanceolado redondeado por delante y detrás, cuyo tegumento es grueso e inerme. Ventosa oral algo mayor que la ventral. Prefaringe y esófago cortos. Divertículos intestinales angostos, que alcanzan hasta el extremo posterior del cuerpo. Testículos redondeados, indivisos, uno al lado o un poco más atrás que el otro. Vesícula seminal dividida en dos mitades, una dentro y otra fuera de la bolsa del cirro, ésta angosta y poco desarrollada. Poro genital ubicado directamente por delante del borde anterior de la ventosa ventral. Ovario por delante del testículo derecho, generalmente tripartido. Receptáculo seminal grande, en la línea media, al lado del ovario. Folículos del vitelógeno pequeños y numerosos, ubicados como en el género *Hamacreadium* a los lados del cuerpo y sólo por detrás de los testículos rodean los divertículos intestinales. Utero corto, ubicado entre los divertículos intestinales desde los testículos hasta la ventosa ventral. Huevos grandes y poco numerosos.

Parásitos del estómago de peces fluviales.

EOCREADIUM INTERMEDIUM Szidat,1954

En abril de 1949 el doctor Angelescu hallo tres ejemplares inmaturos de este interesante trematode en el estomago de PLECOSTOMUS COMMERSONI (Cuv. & Val) Günther. Yo encontre tambien varios ejemplares maduros y algunos muy jovenes en el estomago del mismo huesped en enero de 1950.

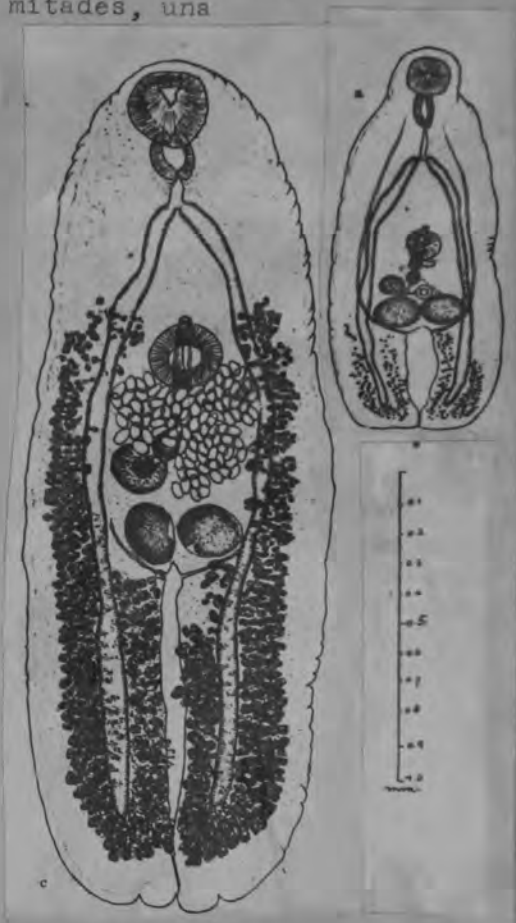
Este verme se halla ubicado curiosamente entre los generos LEPOCREADIUM Stossich, LEPIDAPEDON Stafford, HOMALOMETRON Stafford y HAMACREADIUM Linton, lo cual vuelve a poner en duda la validez de la actual division de los Allocreadiidae en subfamilias. Este verme debia incluirse en el genero HAMACREADIUM por la posicion de los testiculos, la del ovario, en general claramente tripartido, la posicion y conformacion de los foliculos del vitelogeno y la del utero, asi como la carencia absoluta de puas (spines) en la cuticula. Pero como la ventosa oral es mayor que la ventral y ademas la vesicula seminal esta dividida en dos mitades, una

fuera y otra dentro de la bolsa del cirro, debía pertenecer al género *Lepocreadium*. Por el contrario, el poro genital se encuentra inmediatamente por delante de la ventosa ventral, como en el género *Homalometron*, pero éste carece totalmente de la bolsa del cirro. Por otra parte la

vesícula excretora tiene la forma de la del género *Lepidapedon*, es decir que posee un tronco corto que llega hasta los testículos y dos conductos longitudinales que parten de él y llegan hasta el extremo anterior del cuerpo. Como se alojan en el estómago se relacionan con el género *Pharyngora*, cuyos miembros también parasitan el mismo órgano, y finalmente el verme vive en un pez de agua dulce como lo hacen los

géneros *Plagioporus* y *Sphaerostomum* a los que ya Manter en 1940 quiso reunir, junto con *Podocotyle*, en el género *Hamacreadium*.

Mientras no se complete una revisión de toda la familia me parece superflua toda discusión sobre la validez de los distintos géneros. Lo único que podemos establecer por el momento es que esta especie no pertenece a ninguno de los géneros descriptos de *Allocreadiidae*, algunos de los cuales se han citado más arriba, sino que debe constituir un género nuevo, que podría definirse como una forma mixta que reuniera ciertos caracteres de una cantidad de géneros ya conocidos. Por lo tanto podría considerarse como una forma muy primitiva de la que se hubieran diferenciado los otros géneros por el desarrollo especial de algunos de sus caracteres. En el transcurso de este trabajo se verá que la reunión, en una especie, de caracteres de varios géneros y aun de varias familias, lo que condiciona una posición intermedia primitiva, es uno de los signos notables de los trematodes del Río de la Plata y tal vez de toda la parte sur de Sudamérica. Saco como conclusión, que puede considerarse como muy primitiva a toda la fauna de trematodes de la parte mencionada, la que posiblemente no se halle lejos de su lugar de origen y de aquí se haya irradiado en numerosos géneros más diferenciados.



1. — *Eocreadium intermedium n. g., n. sp.* del estómago de *Plecostomus commersoni* (Cuv. Val.) Günther: *a*). Ejemplar inmaduro después de salir del quiste; *b*). Ejemplar joven al incipio de la oviproducción; *c*). Ejemplar maduro.

He fijado los ejemplares según la técnica de agitación de Looss, sin comprimirlos. El cuerpo queda aplanado, de forma lanceolada, con sus extremos redondeados, de 2.8 a 3.0 mm de largo y 1.0 mm de ancho. El tegumento, al igual que en el género *Hamacreadium*, es siempre totalmente desnudo, y como en otros géneros parásitos del estómago, notablemente grueso y algo arrugado. La ventosa bucal tiene 0.25-0.30 mm de diámetro y es por lo tanto mayor que la ventral. Esta está ubicada al final del tercio anterior del cuerpo y mide 0.20-0.22 mm de diámetro. Sólo en los ejemplares jóvenes, y no en todos los casos, se puede ver la prefaringe. La faringe tiene un diámetro de 0.15-0.18 mm. El esófago es corto y del mismo largo que la faringe. Los divertículos intestinales, lisos y relativamente angostos, alcanzan casi hasta el extremo posterior del cuerpo.

Los dos testículos son redondos a ovales, transversos y se ubican en la mitad del cuerpo uno al lado del otro o uno un poco detrás del otro. Sus vasa efferentia se dirigen a la vesícula seminal externa, fuera de la bolsa del cirro que desemboca por un conducto corto en la vesícula seminal interna (dentro de la bolsa del cirro). Ambas vesículas seminales son de igual tamaño. La bolsa del cirro es angosta y poco desarrollada, y sobrepasa en la mitad de su propio largo, al borde posterior de la ventosa ventral. Como en el género ***Homalometron*** el poro genital se ubica inmediatamente por delante del borde anterior de la ventosa ventral.

El ovario, ubicado a la derecha de la línea media, tiene un contorno oval transverso, y en la mayoría de los casos muestra una división interna en tres partes. A la izquierda de él, en la línea media, está el receptaculum seminis, que según esté más o menos lleno puede ser del mismo tamaño o menor que el ovario. Los numerosos y pequeños folículos del vitelógeno se distribuyen así: por delante de los testículos en los bordes del cuerpo, por fuera de los diverticulos intestinales, alcanzando aproximadamente hasta la altura del borde anterior de la ventosa ventral; por detrás de los testículos, rodean los extremos de los divertículos intestinales, en forma de cucurucho, y dejan libre solamente un lugar alrededor de la vesícula excretora en la línea media.

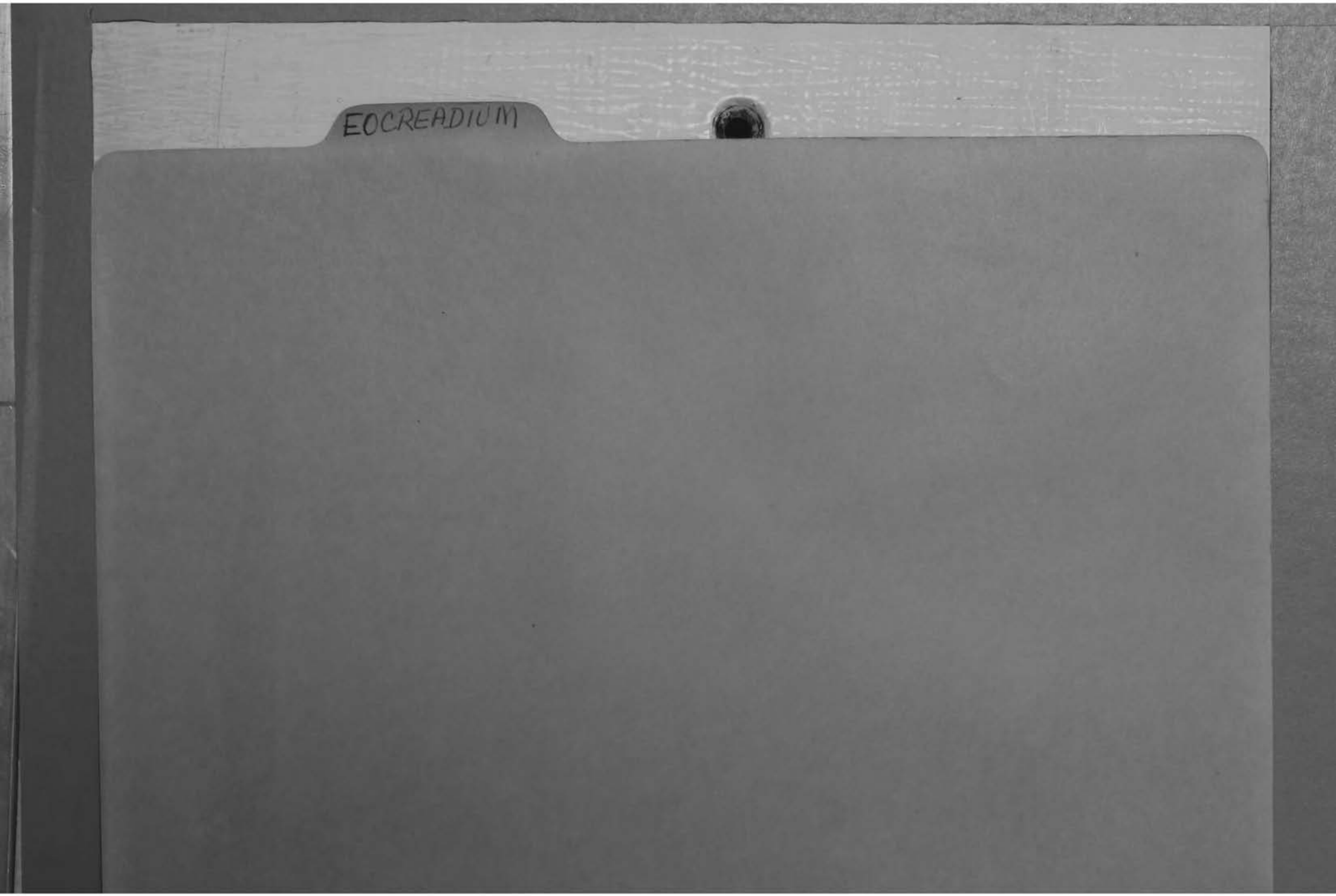
El útero ocupa sólo el lugar que queda entre los divertículos intestinales por delante de los testículos hasta el poro genital y contiene sólo pocos huevos. Estos miden 0.11-0.12 mm de largo y 0.060-0.068 mm de ancho.

La vesícula excretora, tubular, alcanza con su tronco principal sólo hasta los testículos. Muy poco por delante del borde anterior de éstos se bifurca dando a cada lado una rama gruesa que puede seguirse hasta la ventosa oral.

Huésped: *Plecostomus commersoni* (Cuv. & Val.) Günther.

Ubicación de los parásitos: Estómago.

Localidad: Río de la Plata frente a O. S. N., Buenos Aires.


EOCREADIUM

Eucreadium Dayal, 1950

Generic diagnosis. — Allocreadiidae, Allocreadiinae: Body small, elongate, unarmed. Oral sucker large, subterminal, followed by short prepharynx. Pharynx strongly muscular; esophagus rather short, bifurcating about midway between pharynx and acetabulum; ceca reaching

to posterior extremity. Acetabulum large, prominent, pre-equatorial. Testes lobed, directly tandem, post-equatorial. Cirrus pouch preacetabular, enclosing well developed seminal vesicle, prostatic complex and muscular cirrus. Genital pore submedian, pre-acetabular. Ovary lobed, submedian, between acetabulum and anterior testis. Receptaculum seminis and Laurer's canal present. Vitellaria extending in lateral fields from pharynx to posterior extremity, confluent in posttesticular area. Uterine coils confined to pretesticular area. Excretory vesicle tubular, reaching to posterior end of fore testis. Parasitic in intestine of freshwater fishes.

Genotype: *E. eucreadium* Dayal, 1950, (Pl. 102, Fig. 1236),[1]) in *Eutropiichthys vacha*, Lucknow, India.

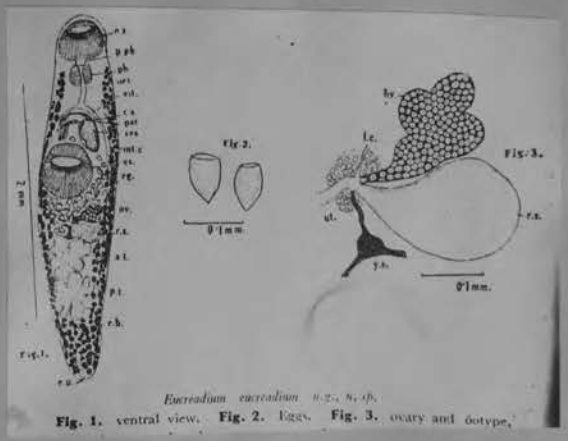
[1]) Dayal (Proc. 28. Ind. Sc. Cong. Pt III, p. 171, Abstract, 1942) designated *E. eutropiichthyius* as genotype, but changed it to *E. eucreadium* in his 1950 paper.

EUCREADIUM Dayal,1950

Skin smooth. Acetabulum protruding slightly, larger than oral sucker. Prepharynx, pharynx, and esophagus well developed; ceca extending to hind end of posterior testis or a little beyond. Excretory vesicle to hind end of anterior testis. Genital pore preacetabular a little to left. Testes lobed, tandem, in posterior half of body. Cirrus sac in front of acetabulum. Ovary lobed, in front of testes. Seminal receptacle and L. canal present. Vitellaria cheifly lateral from pharynx to posterior end of body. Uterus between anterior testis and acetabulum. Eggs with shell pointed at anopercular end.

Type species: E.eucreadium Dayal,1950
from Eutropiichthys vacha, a freshwater fish at Lucknow, India.

Supposedly differs from Allocreadium, Caudotestis, and others in "position and structure of cirrus sac, in position of genital pore and in pointed end of the egg shell."



Eucreadium eucreadium n.g., n. sp.

Fig. 1. ventral view. **Fig. 2.** Eggs. **Fig. 3.** ovary and ootype.

Genus *Eucreadium* Dayal, 1950

This genus has been included by Skrjabin, Petrow and Koval (1958) in Plagioporinae, Opecoelidae.

Diagnosis : Allocreadiinae : Body small, elongate, 3.1 long, unspined. Oral sucker large, subterminal. Acetabulum prominent, larger than oral sucker, precquatorial. Prepharynx short ; pharynx well developed; oesophagus short or moderately long ; caeca reaching near posterior extremity. Genital pore submedian, immediately preacetabular. Testes tandem, postequatorial, lobed. Cirrus sac preacetabular, enclosing bipartite vesicula seminalis, pars prostatica and cirrus. Vesicula seminalis externa absent. Ovary lobed, submedian. Receptaculum seminis and Laurer's canal present. Vitellaria lateral from pharynx to posterior extremity, confluent in posttesticular region. Uterine coils between anterior testis and acetabulum. Excretory vesicle tubular, reaching hinder end of anterior testis. Parasitic in intestine of fresh water fishes.

Genotype : *Eucreadium eucreadium* Dayal, 1950.

FROM H.R. MEHRA (1966)

Allocreadiidae

EUCREADIUM EUCREADIUM ~~N. G., N. SP.~~ DAYAL, 1950

A number of specimens were collected from the intestine of a fresh-water fish, *Eutropiichthys vacha*, obtained from a tank in Lucknow. *Eucreadium eucreadium* is a small elongated trematode with rounded anterior and posterior ends. The skin is smooth, being devoid of spines. The worm is 3.1 mm. long by 0.68 mm. broad in the region of the ventral sucker.

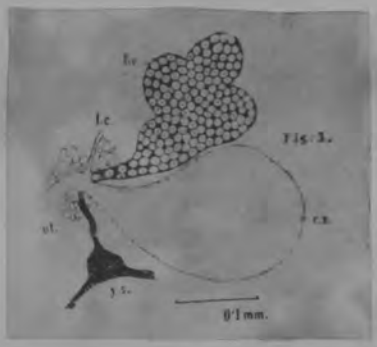
The oral sucker is oval and subterminal in position. It is 0.33 mm. long by 0.4 mm. broad. The ventral sucker is well developed and protrudes a little from the general surface of the body. It is larger than the oral sucker and is 0.49 mm. long by 0.42 mm. broad. The ventral sucker lies at a distance of 1. 1 mm. from the anterior end of the body.

The mouth is a transverse slit in the anterior region of the oral sucker. It leads into a small prepharynx, about 0.05 mm. long. The latter opens into a strong muscular pharynx, 0.17 mm. long by 0.2 mm. wide. Posterior to pharynx is the oesophagus, 0.18 mm. long by 0.04 mm. wide. The latter divides into two intestinal caeca which run upto the hinder end of the posterior testis. In some cases the caeca extend a little beyond the posterior testis.

The excretory pore lies at the posterior end of the body. It leads into a long tubular excretory bladder, which extends upto the hinder end of the anterior testis.

The genital opening is situated in front of the ventral sucker a little to the right of the median line.

The male reproductive organs consist of two deeply lobed testes lying one behind the other in the posterior half of the body. The anterior testis lies at a distance of 1.89 mm. from the anterior end of the body and is 0.38 mm. long by 0.35 mm. broad. The posterior testis is 0.42 mm. long by 0.3 mm. broad. It lies just behind the anterior testis at a distance of 2. 27 mm. from the anterior end of the body. In some cases the two testes are a little distance apart from each other. The cirrus sac is a recurved structure in the form of an inverted U with the left limb longer than the right. The left limb is 0.37 mm. long by 0.17 mm. wide. The right limb is 0.21 mm. long by 0.08 mm. wide. Nearly the whole of the left limb of the cirrus sac is occupied by vesicula seminalis, which is divided by a constriction into two oval sacs. The anterior portion is nearly globular with a diameter of 0.13 mm. The posterior portion of the vesicula seminalis is smaller than the anterior and is 0.11 mm. long by 0.09 mm. wide. The vesicula seminalis opens by a short duct into a pars prostatica which runs transversely towards the right. It is tubular in shape and is 0.17 mm. long by 0.05 mm. wide. The latter opens into a backwardly directed muscular cirrus, 0.11 mm. long by 0.05 mm. wide. It opens to the exterior at the genital pore. A large number of prostate gland cells are present round the pars prostatica.



The female reproductive organs consist of an ovary, divided into four or five lobes. It is 0.17 mm. long by 0.28 mm. broad, and is situated at a distance of 1.62 mm. from the anterior end of the body and 0.09 mm. behind the ventral sucker on the left of the middle line. From its inner side arises the oviduct which opens at the öotype. A large pear-shaped receptaculum seminis lies behind the ovary and

- OVER -

opens at the öotype. The receptaculum seminis is 0.16 mm. long by 0.35 mm. broad. A Laurer's canal is present.

The vitelline glands consist of small follicles extending from the pharynx to the posterior end of the body. They are mainly lateral in position but partly cover the intestinal caeca and extend at places into the intercaecal space particularly behind the posterior testis where they extend towards the middle line. The two transverse vitelline ducts formed by the union of other ducts unite in the middle line in front of the anterior testis to form a small yolk reservoir, which opens at the öotype.

The uterus arises from the right side of the öotype opposite the opening of the oviduct. It forms few coils between the anterior testis and the ventral sucker. The terminal portion of the uterus lies on the left side of the ventral sucker and is muscular.

The eggs are oval, operculated and with the shell pointed at the anopercular end. They are 0.07-0.08 mm. long by 0.05-0.055 mm. broad.

The distinguishing characters of the new form, *Eucreadium eucreadium*, may be summarised as follows :-

1. Skin smooth, devoid of spines.
2. Ventral sucker well developed, larger than the oral sucker and protrudes a little from the ventral surface.
3. Prepharynx, pharynx, and oesophagus well developed.
4. Intestinal caeca extending upto the hinder end of the posterior testis or a little beyond it.
5. Excretory pore terminal at the posterior end and opening into a tubular excretory bladder extending upto the hinder end of the anterior testis.
6. Genital aperture in front of the ventral sucker, a little to the left of the median line.
7. Testes lobed, one behind the other, in the posterior half of the body.
8. Cirrus sac in front of the ventral sucker with well developed vesicula seminalis, pars prostatica, muscular cirrus, and prostate glands.
9. Ovary lobed, in front of testes and behind the ventral sucker.
10. Receptaculum seminis, yolk-sac, and Laurer's canal present.
11. Vitelline glands mainly lateral in position, extending from the pharynx to the posterior end of the body.
12. Uterus between the anterior testis and ventral sucker, terminal portion muscular.
13. Eggs oval, operculated with shell pointed at the anopercular end.

Remarks—The present form, differs from the genera *Helicometra*, *Helicometrina*, *Helicometroides*, *Diplobulbus*, and *Stenopera* in the absence of filamentous eggs. From *Allocreadium*, *Peracreadium*, *Caudotestis*, *Pedunculacetabulum*, *Podocotyle*, *Choanostoma*, *Cianocreadium*, *Eurycreadium*, and *Kaurma* it differs in the position and structure of the cirrus sac, in the position of the genital pore and in the possession of a pointed protuberance at the anopercular end of the eggs. The genera possessing knobs at the anopercular end are *Maculifer*, *Podocotyloides* and *Decemtestis*. From *Maculifer* it is distinguished by the structure of the prepharynx, position of the genital pore, the extent and structure of the cirrus sac, and the presence of a distinct pars prostatica. From *Podocotyloides* it is distinguished by the structure of the cirrus sac, the cirrus and the position of the genital pore. The position of the genital pore, the structure of the cirrus sac and the number of testes would readily separate it from *Decemtestis*. From *Pycnadena* it is distinguished by the position of the genital pore and the structure and position of the cirrus sac. Thus, it differs from all the known genera of the family ALLOCREADIIDAE and hence a new genus *Eucreadium*, is created for its reception.

Host.— *Eutropiichthys vacha*.
Location.— intestine.
Locality.— Lucknow.

Encreadium cameroni n. sp. (Figs. 1-2)

Gupta, 1963

MATERIAL: One specimen.
HOST: *Chela gora*.
LOCATION: Small intestine.
LOCALITY: Banaras.

DESCRIPTION: Body elongate, unarmed, rounded at extremities, 3.16 × 0.88 mm. in size. Oral sucker nearly spherical, 0.32 × 0.31 mm. in size. Ventral sucker larger than oral sucker, pre equatorial, 0.41 mm. in diameter and lies at 0.82 mm. from anterior extremity. Prepharynx small; Pharynx muscular, 0.14 × 0.15 mm. in size; Oesophagus short, tubular and slightly curved, about 0.1 mm. long; Intestinal caeca simple, narrow, not close to lateral margins of body, extending through zone of posterior testis. Excretory pore at posterior end of body. Excretory bladder tubular reaching to posterior testis. Genital pore 0.71 mm. from anterior extremity, median, and a little posterior to bifurcation of intestinal caeca. Testes lobed, directly tandem, intercaecal and nearly in post equatorial region of body. Testes in same field, their zones contiguous. Anterior testis 0.52 × 0.52 mm. in size and 1.46 mm. from anterior extremity. Posterior testis 0.71 × 0.46 mm. in size and 0.42 mm. from hind end. Cirrus sac elongated, lying closely on right side of ventral sucker and extends from genital pore to middle region of ventral sucker measuring 0.76 × 0.09 mm. in size and divisible into two parts, posterior cylindrical and N-shaped while anterior curved into an elongated tube to right side of body. Vesicula seminalis at basal part of cirrus sac and divided into two parts transversely; posterior part large, N-shaped and cylindrical 0.56 × 0.083 mm. in size while anterior smaller and globular, 0.12 × 0.09 mm. in size; opens into a tubular pars prostatica, 0.08 × 0.04 mm. in size, which runs transversely towards left and surrounded by prostate gland cells, then continued forward into a backwardly directed narrow tubular ejaculatory duct, 0.46 mm. long, opens at genital pore. Ovary entire, oval, between ventral sucker and anterior testis, 0.31 × 0.19 mm. in size at a distance of 1.31 mm. from anterior extremity. From its median side arises oviduct uniting with oötype. Receptaculum seminis pear-shaped, 0.3 × 0.19 mm. in size, lying on right side of body a little distance apart from ventral sucker and opens at oötype. Laurer's canal present. Vitelline follicles numerous, small, extending from middle region of oral sucker to posterior end of body. Vitelline follicles run mostly lateral but confluent in posterior terminal part of body. Two transverse vitelline ducts unite in front of anterior testis forming yolk reservoir. Uterine coils extending posteriorly parallel to ovary, winding anteriorly up to middle of ventral sucker, turning posteriorly running between ovary and ventral sucker and then extending anteriorly to genital pore. Eggs oval and operculated, 0.04 0.05 × 0.035 0.055 mm. in size.

DISCUSSION: This species closely resembles *E. encreadium* Dayal, 1950[a] the only other species reported from *Eutropiichthys vacha* but differs in the extension of vitellaria from middle of oral sucker up to hind end of body instead from pharynx region, in having ovary entire instead divided into 4 or 5 lobes, in having genital pore median instead a little to the right of median line, in having receptaculum seminis on the right side of body instead behind the ovary, in the absence of pointed shell at opercular end of egg and in the structure and position of cirrus pouch. In the new species the cirrus pouch extends to middle of ventral sucker on right side instead in front and the posterior portion of vesicula seminalis is cylindrical and N-shaped and much larger in size.

It is accordingly regarded a new species with the specific name of *E. cameroni* sp. nov.

The new species is named in honor of Professor Thomas W. M. Cameron, Director, Institute of Parasitology, McGill University, Macdonald College, P.O. Que. Canada.

1

Proc. Helm. Soc. Wash., 30(1): 96-100. 1963

BASHIRULLAH, 1972

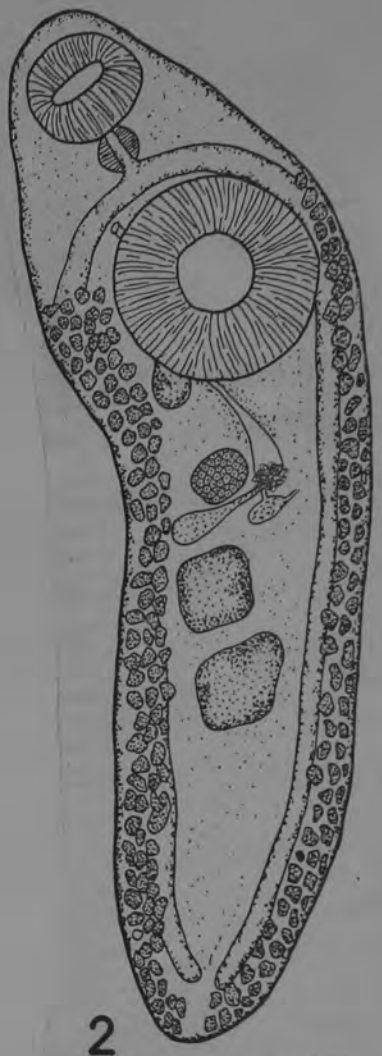
Eucreadium daccai sp. nov.
Host–*Channa (Ophiocephalus) punctatus*
Site–Intestine
Locality–Dacca

Description (based on two worms): The body of the worm is flat, foliate and pointed at the posterior end. It measures 1.35–1.6 in length and 0.51–0.81 in width at the level of the acetabulum. The sucker is subterminal and is almost round, measuring 0.17–0.18 in diameter. The acetabulum is round and measures 0.30 × 0.28–0.31 × 0.30. It is situated on the ventral surface at the anterior third of the body. The subterminal mouth leads to a small prepharynx followed by a small round muscular pharynx measuring 0.11 × 0.15. The pharynx is followed by a small slender oesophagus and bifurcates into two intestinal caeca which reach the posterior extremity of the body.

The testes are longitudinally elongated in structure, separated from each other, and tandem in position in the posterior half of the body. The anterior testis measures 0.19–0.21 × 0.17–0.21. The posterior one is slightly larger than the anterior and measures 0.21–0.23 × 0.09–0.19. The cirrus sac is latero-transversely curved and situated in between the acetabulum and intestinal bifurcation. The vesicula seminalis is spiral in shape. A globular pars prostatica and small muscular cirrus are present. The genital pore is submedian at the level of intestinal bifurcation.

The ovary, which is almost round and measures 0.11–0.16 × 0.12–0.16 is situated lateral to the acetabulum. A pear-shaped recepticulum seminalis lies posterior to the ovary at the median and submedian field and measures 0.12–0.19 × 0.03–0.06. A muscular Laurer's canal is present. The uterus is post-testicular The metraterm is muscular and opens separately at the genital pore. The eggs are oval, operculate, pointed at the anopercular end and measure 0.05 × 0.03.

The vitelline follicles are at the lateral fields and extend from the level of the acetabulum to the posterior extremity but are not contiguous in the post-testicular region. The vitelline ducts of the two sides open separately in the vitelline reservoir and a common vitelline duct arises from the anterior part of the reservoir to open into the ootype. The excretory bladder is tubular, reaching up to the hind margin of the anterior testis, and has a terminal opening



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Eucreadium daccai n. sp. (adult).

DISCUSSION

The genus *Eucreadium* was created by Dayal (1950) with *E. eucreadium* Dayal 1950 from *Eutropiichthys vacha* (Hamilton) as genotype. Srivastava & Singh (1967) added the second species *E. jhingrani* from *Puntius chagunio* (Ham.) to *Eucreadium*. *Eucreadium daccai* n. sp. resemble closely *E. jhingrani* but differ in the ratio of oral sucker and acetabulum, and in the arrangement of the vitelline follicles – which are lateral to the intestinal caeca extending from the level of acetabulum to the extreme posterior end – and not confluent to the post-testicular region, in the structure of the ovary and in the position of the cirrus pouch.

The binominal, *Eucreadium daccai* n. sp., is proposed for the present species, considering the distinguishing characteristics discussed above.

EUCREADIUM

Eurycreadium Manter, 1934

Generic diagnosis. — Allocreadiidae, Allocreadiinae: Body small, broadened toward middle, unspined. Oral sucker terminal, followed by very short prepharynx; pharynx small; esophagus moderately long; ceca half long, not extending back of testes. Acetabulum moderately large, pre-equatorial or equatorial. Testes symmetrical or diagonal, near posterior extremity. Cirrus pouch club-shaped, overlapping acetabulum. Genital pore pre- or postbifurcal, median or slightly to the left. Ovary usually a little to the right of median line, between acetabulum and testes. True seminal receptacle absent. Laurer's canal present. Uterus entirely pretesticular; eggs few, comparatively large. Vitellaria circumcecal or mostly dorsal, extending from level of pharynx to testicular zone. Excretory vesicle tubular or saccular, reaching to near ovary. Parasitic in intestine of marine fishes.

Genotype: *E. vitellosum* Manter, 1934 (Pl. 10, Fig. 130), in *Laemonema barbatulum;* Florida.

Other species:

E. lethrini (Yamaguti, 1938) Yamaguti, 1942 (syn. *Rhodotrema l.* Y.), in *Lethrinus haematopterus;* Inland Sea of Japan.

E. problematicum (Issaitschikow, 1928) Manter, 1934 (syn. *Rhodotrema p.* I.) in *Gymnacanthus tricuspis, Lycodes agnostus* and *Hippoglossoides platessoides;* Russian Arctic.

E. skrjabini (Issaitschikow, 1928) Manter, 1934 (syn. *Rhodctrema s.* I.) in *Lycodes agnostus;* Russian Arctic.

ALLOCREADIIDAE
Allocreadiinae

EURYCREADIUM Manter, 1934

Allocreadiinæ with bodies more or less broadened; ventral sucker larger than oral sucker, with longitudinal aperture. Very short prepharynx; esophagus moderately long, ceca short, not extending behind testes. Genital pore preacetabular, to the left. Cirrus sac with large, undivided seminal vesicle, weak prostate gland and narrow cirrus. Testes symmetrical or diagonal. Ovary 3- or 4-lobed, to the right or submedian, postacetabular, pretesticular. Uterus entirely pretesticular; eggs few, large, thin-shelled. True seminal receptacle absent; Laurer's canal present. Vitelline follicles extensively developed, mostly dorsal, extending into forebody. Excretory vesicle simple, unbranched, sac-like.

1. *Type species*—*Eurycreadium vitellosum*.

Eurycreadium differs from all other genera in the family in the position of the testes posterior to the ends of the short ceca. The lack of a seminal receptacle and the extensive distribution of the vitellaria are unusual features.

The name *Eurycreadium* is from *eury*, broad, and *creadium*, referring to a broad, Creadium-like trematode. The name *vitellosum* refers to the extensive development of the vitellaria.

Other species:

2. E. skrjabini (Issaitschikow, 1928) Manter 1934
3. E. problematicum (" ") " "
4. E. lethrini (Yamaguti, 1938) Yamaguti, 1942

cf with Stenakron Stafford 1904
see Miller 1941
Linton 1901 fig. 359

5. E. quinquelobatum (Layman, 1930) Ching, 1961

Eurycreadium vitellosum n.gen., n.sp.

(Fig. 64)

Host—*Læmonema* sp.
Position—Intestine.
Frequency—Present in 1 of 9 hosts examined.
Depth—249+ fathoms.

Specific Diagnosis

Body unspined, rather broad and thick, tapering toward each end, widest and thickest about at midbody, more pointed posteriorly, length 1.7 to 2.18 mm., width about ½ body length or a little more, depending on degree of contraction. Forebody mobile, capable of considerable extension. Oral sucker terminal; mouth terminal or subterminal; ventral sucker about 1/3 from anterior end, not very powerful, 1½ to 2 times the diameter of oral sucker, its aperture longitudinal. Very short prepharynx, apparently absent when forebody is contracted; ovoid pharynx; muscular esophagus longer than pharynx; intestinal bifurcation at anterior border of ventral sucker; ceca curving around the ventral sucker and ending at the anterior borders of the testes, thus scarcely extending beyond midbody, usually somewhat enlarged terminally. Genital pore prebifurcal, slightly to the left. In one specimen (fig. 64) it was opposite the pharynx, in another (with extended forebody) it was opposite anterior portion of esophagus. Cirrus sac elongate-clavate in shape, gradually enlarging toward its base which is dorsal to the middle of ventral sucker; most of cirrus sac filled with the undivided, sac-shaped seminal vesicle; prostate gland very weakly developed. Testes large, symmetrical or slightly diagonal, smooth or slightly lobed, directly posterior to the tips of the ceca, somewhat wider than long, occupying the greater part of the body diameter. Ovary 3- or 4-lobed, to the right, a short distance anterior to right testis; uterus coiling to the left then forward along the right border of, or dorsal to, the ventral sucker, not extending posterior to testes; early coils of uterus narrow and muscular, a terminal metraterm also muscular. True seminal receptacle lacking, sperm cells in early coils of uterus may accumulate adjacent to Mehlis' gland. Laurer's canal long, coiled, opening dorsally anterior to the ovary. Vitelline follicles fairly large and well distributed through the body dorsally, anteriorly extending to the pharynx and posteriorly to a point shortly behind the testes, not limited to a lateral position but overlapping all the organs including the ventral sucker. They also occur to some extent ventral to the ceca. Yolk ducts crossing body at about the level of the ovary; yolk reservoir dorsal to ovary. Eggs large, few in number, with thin, yellow shells, star-shaped in cross-section, size variable, the largest being 82 to 84 by 36 to 40 μ but some young, apparently normal, eggs only 68 by 31 μ. Excretory pore terminal, excretory vesicle at first narrow, then widening into a lobed, sac-like form, unbranched, terminating abruptly, immediately posterior to ovary.

Comparisons

The similarities of this trematode to the Fellodistomidæ including the short ceca, lobed ovary and the symmetrical testes are superficial and misleading. There can be little doubt of its position in the Allocreadiidæ as indicated by its short uterus anterior to testes, large and few eggs, character of the cirrus sac, extent of the vitellaria, and the sac-shaped excretory vesicle. The possible symmetrical position of the testes is unusual for allocreadids but occurs also in the genus *Microcreadium* Simer, 1929 (which is, however, not a close relative). What seem to be the most closely related forms yet described are two species described by Issaitschikow (1928) from the Russian Arctic. These were described and figured as "*Rhodotrema skrjabini* and *Rhodotrema problematicum*." *Rhodotrema* is a genus of the Fellodistomidæ. Yet Issaitschikow's species differ radically from *Rhodotrema* in that the uterus does not extend behind the testes, the cirrus sac does not show the characters of *Rhodotrema*, the eggs are large, and the excretory vesicle is not V-shaped but a simple, undivided sac. On the other hand, these two species agree with the present form in many characters such as short ceca terminating immediately anterior to testes; diagonal or symmetrical, large testes; 3-lobed ovary; widened body; longitudinal aperture of the ventral sucker; the dorsal, extensive vitellaria; and the excretory vesicle. Both of Issaitschikow's species differ from the present form in more posterior genital pore, shorter esophagus, and in that the vitellaria do not extend posterior to the testes. It is proposed to unite them with the above species in the genus *Eurycreadium*. Their names thus become *Eurycreadium skrjabini* (Issaitschikow, 1928) n. comb. and *Eurycreadium problematicum* (Issaitschikow, 1928) n. comb.

64

(over)

From Ching (1961)

Description

Body smooth, length, 1 to 1.3; width at level of ventral sucker, 0.431–0.634. Oral sucker subterminal, round, 0.125–0.150 in diameter; prepharynx lacking; pharynx, 0.053–0.088 by 0.058–0.070. Oesophagus shorter than pharynx, 0.035–0.049. Ventral sucker with longitudinal aperture, 0.255–0.295 in diameter, nearly twice the diameter of oral sucker. Genital pore opening opposite the middle of the pharynx. Cirrus sac club-shaped, extending slightly posterior and dorsal to ventral sucker in two specimens, to the right and not reaching past the mid-ventral sucker in the other specimen. Seminal vesicle undivided, prostate gland weakly developed, cirrus long and narrow. Testes smooth, large, slightly oblique to tandem, oval to round. Ovary with three to four lobes, lateral to right caecum, slightly overlapping the caecum dorsally at the posterior level of ventral sucker. Oviduct long and coiled. Uterus pretesticular with few coils extending anterodorsally to ventral sucker. Seminal receptacle within uterus. Laurer's canal coiled posterior to ovary, opening dorsally. Vitellaria mostly dorsal, abundant throughout body from level of pharynx to middle of testes and overlapping organs within the area. Eggs measure 64–75 by 29–35 μ. Excretory vesicle diamond-shaped, overlapping anterior edge of testes, surrounded by gland cells before terminating at excretory pore; excretory pore terminal.

Discussion

The specimens differ from the original description in the shorter oesophagus and pharynx, tapered instead of enlarged ends of the caeca, and extent of the vitellaria to the mid-testes instead of posterior to the testes. The ovary appears to be mostly lateral to the right caecum with part of the lobes overlapping dorsally. The eggs are slightly smaller, 64–75 by 29–35 μ instead of 82–84 by 36–40 μ.

Manter (3) transferred two fellodistomatids, *Rhodotrema skrjabini* Issaitchikow, 1928 and *R. problematicum* Issaitchikow, 1928, to *Eurycreadium* because of their extensive vitellaria, sac-shaped excretory vesicle, and type of cirrus sac. Yamaguti (6) also transferred a species, *Rhodotrema lethrini* Yamaguti, 1939, to this genus in support of Manter's belief that the worms only superficially resembled fellodistomatids. However, Skrjabin and Koval(5) retain these three species in the original genus of fellodistomatids and also included *Rhodotrema quinquelobata* Layman, 1930 and *R. quadrilobata* Baskikalowa, 1932 (which Shulman and Shulman-Albova (4) considered synonymous). The latter species, which is regarded by Yamaguti (7) as *Steringotrema* (*Rhodotrema*) *quinquelobata*, is now transferred to *Eurycreadium*, becoming *E. quinquelobatum* (Layman, 1930). *E. quinquelobatum* is similar to *E. vitellosum* but appears to differ in the location of the genital pore and ovary and the extent of vitellaria.

Cancotestes ?

Fellodistomidae

Eurycreadium

~~Rhodotrema~~ lethrini (Yamaguti, 1938) Yamaguti, 1942

Length: 0.56-1.1 mm.

Width: 0.3-0.6 mm. at middle Measurements exaggerated by cover glass pressure.

Oral sucker: 0.096-0.16 X 0.11-0.18 mm.

Acetabulum: (size:) 0.125-0.25 X 0.2-0.26 mm.
(position): Equatorial.

Sucker ratio:

Esophagus: Short, curved in type subjected to cover glass pressure.
Pharynx: 39-60X35-63 μ.

Genital pore (location): On the right or left of or occasionallyin median line about midway between pharynx & acetabulum.
Testes, shape: Rounded
location: Symmetrical or oblique, at middle of caudal third of body, separated by excretory vesicle.
Cirrus sac (extent): To near middle of acetabulum if no pressure.
Ovary, shape: Subglobular.

location: Usually slightly dextral, occasionally median, at junction of middle with posterior third of body.
Vitellaria: Surround ceca, extend from level of pharynx or esopahgus to testes, sometimes intruding into extra- and post-testicular fields.
Eggs: Not numerous, elliptical, more or less flat at one pole, 72-75 X 45-48 μ.
Other features:

Host: Lethrinus haematopterus (Temm. et Schleg.)

Locality: Tarumi, Japan

Reference: Yamaguti, S., Studies on the helminth fauna of Japan. Part 21 Trematodes of fishes, IV. Kyoto, Japan. 1938
Comparisons: Other species of the genus.

Life cycle:

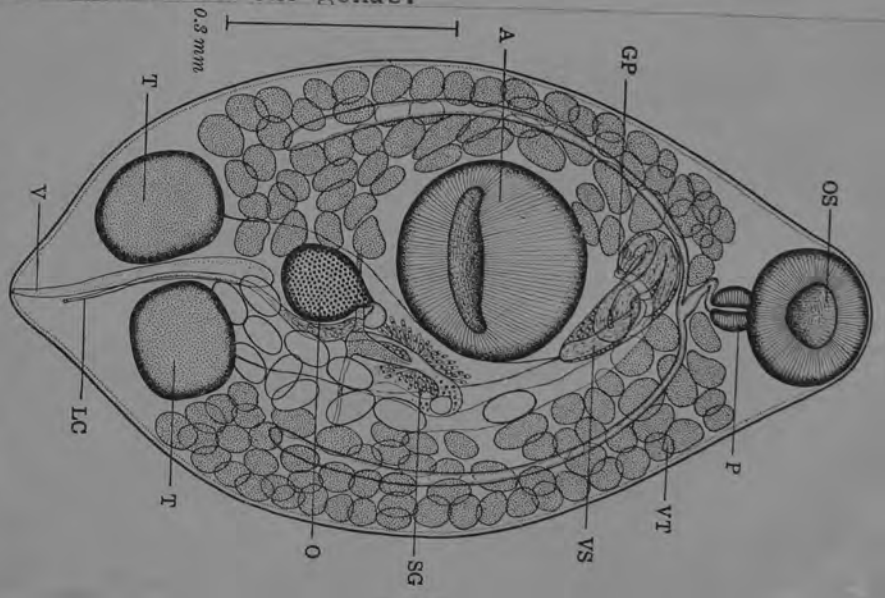


Fig. 54. *Rhodotrema lethrini*; ventral view.

Eurycreadium skrjabini (Issaitschikov, 1928) Manter, 1934

(= Rhodotrema skrjabini)

Host: Lycodes agnostus

Russian Arctic

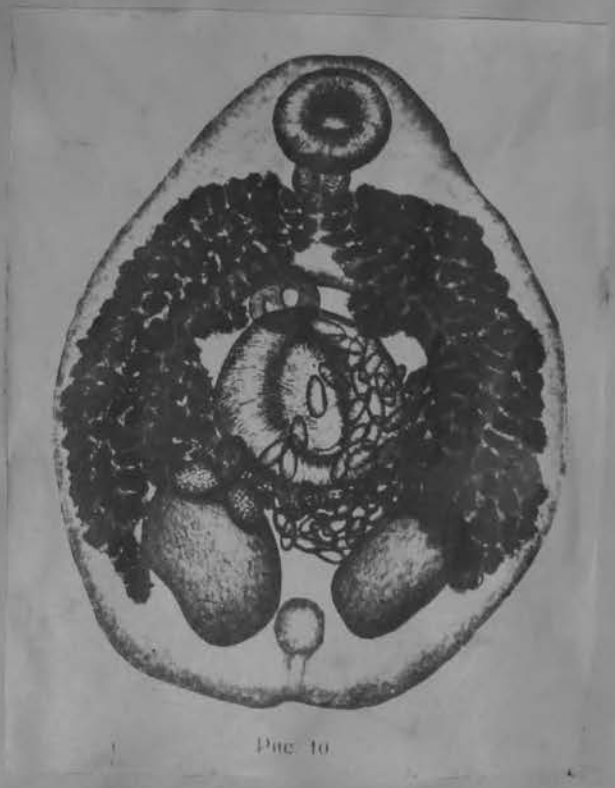
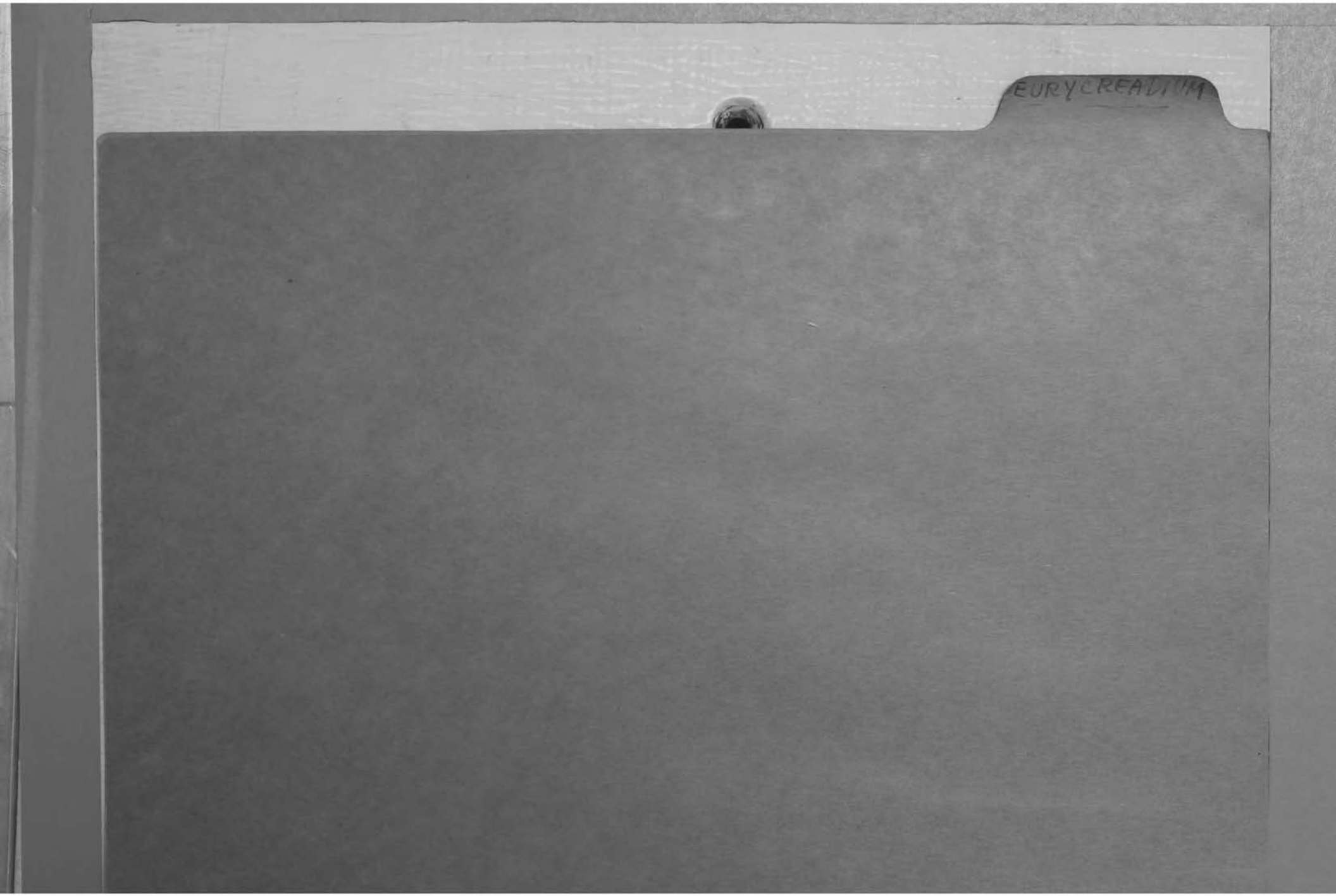


Fig. 10


EURYCREADIUM

Genitocotylinae Skrjabin, Petrow and Koval, 1958

Subfamily diagnosis : Opecoelidae : Body flat, more or less elongate. Prepharynx absent ; pharynx very short ; oesophagus moderately long ; caeca terminating blindly near posterior extremity. Acetabulum projecting or encircled by folds of body wall, without papillae, at anterior one third body length. Accessory sucker present behind genital pore, to left of intestinal bifurcation. Testes tandem, postequatorial. Vesicula seminalis extending posterior to acetabulum. Cirrus sac absent or small forming a muscular sheath around cylindrical pars prostatica and short ejaculatory duct. Genital pore slightly to left of oesophagus. Ovary immediately pretesticular, submedian or median. Receptaculum seminis and Laurer's canal present. Uterus winding in intercaecal field between ovary and intestinal bifurcation or acetabulum, Vitellaria postacetabular or sometimes commencing from intestinal bifurcation to posterior end, confluent behind testes. Excretory vesicle tubular, reaching ovary. Parasitic in stomach or intestine of marine fishes.

Type and single genus : *Genitocotyle* Park, 1937.

From H. R. Mehra (1966)

Genitocotyle Park, 1937

Generic diagnosis. — Allocreadiidae, Opecoelinae: Body flat, more or less elongate, unarmed. Oral sucker subterminal, followed by very short pharynx. Esophagus of moderate length. Ceca terminating near posterior extremity. No anus. Acetabulum projecting or encircled by folds of body wall, without papillae, situated about one third of body length from anterior extremity. Accessory sucker present behind genital pore to left of intestinal bifurcation. Testes tandem, median, postequatorial. Vesicula seminalis extending posterior to acetabulum. Cirrus pouch absent or forming a muscular sheath, containing cylindrical pars prostatica and short ejaculatory duct. Genital pore slightly to left of esophagus. Ovary directly pretesticular, submedian or median. Receptaculum seminis and Laurer's canal present. Uterus winding in intercecal field between ovary and intestinal bifurcation or acetabulum. Vitellaria extending along ceca in hindbody, sometimes intruding into forebody. Excretory vesicle tubular, reaching to ovary. Parasitic in stomach or intestine of marine fishes.

Genotype: *G. acirrus* Park, 1937 (Pl. 10, Fig. 129) in *Holconotus rhodoterus*; California.

Other species: *G. atlantica* Manter, 1947, in *Carapus bermudensis*, *Haemulon flavolineatum*, *Malacoctenus macrops*, *Opisthognathus* sp., *Synagnathus robertsi*; Florida.

Opecoelidae

Genitocotyle gen. nov. Park, 1937

Diagnosis: Allocreadiidae with elongated body, medium size, no spines; oral sucker subterminal; ventral sucker larger than the oral sucker, embedded in the body or pedunculated due to the folds of the body wall; genital sucker present; cirrus sac absent; pars prostatica present; seminal vesicle tubular, elongated and coiled; testes smooth or lobed, tandem, postovarian; ovary smooth or lobed; coils of the uterus intercaecal between the acetabulum and the ovary; seminal receptacle present; Laurer's canal present; eggs large, without filament; excretory pore terminal; excretory bladder simple; vitellaria largely lateral: parasites of fish.

Type species.—*Genitocotyle acirrus*.

Opecoelidae

Genitocotyle acirrus sp. nov. Park, 1937

(Figs. 1–6)

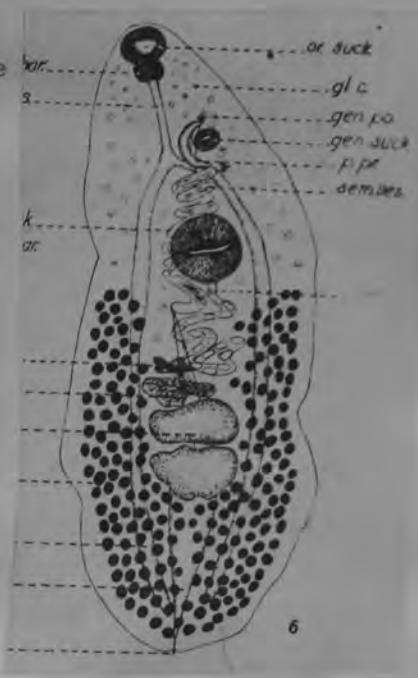
Description: Body elongated by becoming hook-shaped when the folds of the body wall are extended anteriorly and posteriorly to the acetabulum, dorsoventrally flattened, somewhat tapering anteriorly and rounded posteriorly, 2.58(2.03–3.48) mm. in length by 0.87 (0.75–1.13) mm. in width at the level of the acetabulum; cuticula thick and smooth; unicellular glands numerous under the cuticula, especially ventrally in the region of the acetabulum; oral sucker subterminal, 0.20(0.17–0.24) mm. in diameter; ventral sucker preequatorial changing its relative position by extension or contraction of the folds of the body wall, about 1.8 times the diameter of the oral sucker, embedded or pedunculated according to the state of the folds of the body wall, 0.37(0.34–0.42) mm. in diameter; genital sucker at the left of the intestinal bifurcation, 0.18(0.16–0.19) mm. in diameter; prepharynx present, but short; pharynx 0.14(0.11–0.18) mm. in diameter; oesophagus slender and elongated, 0.26(0.15–0.38) mm. in length; intestinal caeca rather smooth and slender, extending to near the posterior end of the body; excretory pore terminal; excretory bladder clavate posterior to the posterior testis, extending to the anterior level of the anterior testis in two small paired diverticula emerging laterally from its anterior end; genital pore anterior to the genital sucker, located to the left; genital atrium short; pars prostatica well developed, C-shaped, passing around the right side of the genital sucker, 0.21–0.38 mm. in length; prostate cells present round the pars prostatica; seminal vesicle tubular, with about ten coils, extending from the posterior end of the pars prostatica to near the middle of the acetabulum and the ovary; testes generally obovoidal or slightly lobed, tandem, median, located midway between the acetabulum and the posterior end, subequal; anterior testis 0.21(0.14–0.30) mm. in length by 0.36(0.29–0.53) mm. in width; posterior testis 0.29(0.17–0.41) mm. in length by 0.36(0.23–0.47) mm. in width; vasa deferentia emerging dorsally from the anterior ends of the testes; ovary anterior to the testes, submedian, smooth or with three or four lobes, 0.14(0.06–0.20) mm. in length by 0.26(0.20–0.38) mm. in width; oviduct originating from the anterior end of the ovary; seminal receptacle anterior to the ovary and small; Laurer's canal long, emerging from the seminal receptacle passing anteriorly, dorsal to the uterus, ending blindly under the cuticula; shell glands diffuse, anterior to the ovary; vitelline reservoir anterior to the ovary; coils of the uterus few, intercaecal between the acetabulum and the ovary; eggs yellowish-brown, large, not operculated, 0.07–0.08 by 0.03–0.04 mm.; vitellaria lateral, well developed, along the outer margins of the caeca, extending dorsally and ventrally over their inner margins, extending from the posterior level of the acetabulum to the posterior end of the body meeting posterior to the posterior testis.

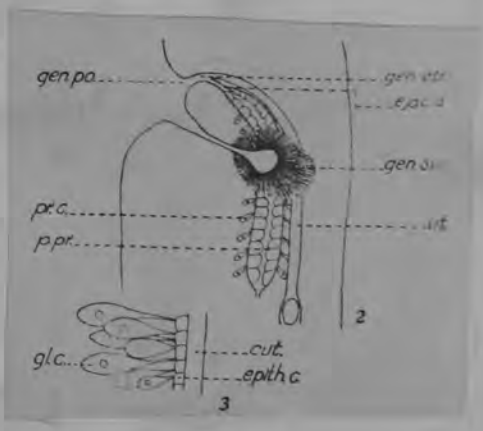
Host.—*Holconotus rhodoterus* Agassiz.

Habitat.—Stomach and upper intestine.

Locality.—Dillon's Beach, California; July, 1933.

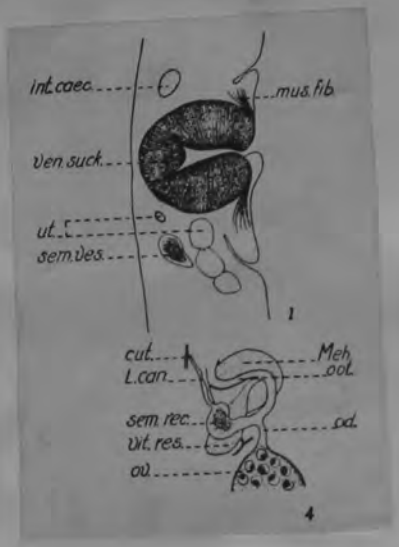
Relationships: *Genitocotyle acirrus* is closely related to *Cymbephallus vulgaris* Manter (1934) in general shape, size, and topography of the organs. However, the presence of genital sucker, the absence of cirrus sac, the cirrus and the long tubular coiled seminal vesicle in *G. acirrus* differentiate it from *C. vulgaris*. The genus *Genitocotyle* may be included in *Cymbephallus* in the future although the absence of a cirrus and cirrus sac, and the presence of the seminal receptacle and Laurer's canal seem to justify the validity of *Genitocotyle* as a genus different from *Cymbephallus* at the present time.





Discussion

The absence of cirrus sac naturally brings up the question as to whether or not the genus *Genitocotyle* gen. nov. should be placed in the sub-family Allocreadiinae Looss(1902). The genus *Cymebephallus* Linton (1934) seems to stand as an intermediate stage between *Genitocotyle* and other genera of Allocreadiinae in point of cirrus sac. *C. vulgaris* possesses a reduced cirrus sac while it is absent in *C. fimbriatus* Linton (1934). The absence of cirrus sac and cirrus should be generic characters even though the absence of cirrus sac was one of the characteristics in the removal of the subfamily *Coitocoecinae* Poche (1925) by Winfield (1929). In that case the main reason for this removal should be the union of the distal ends of the intestinal caeca posteriorly. Ozaki (1929) has created the family *Coitocaecidae* for the genus *Coitocoecum* Nicoll (1915). Woolcock (1935) agrees to the statement by Poche that the absence of the cirrus sac, the union of the caeca and even the absence of the seminal receptacle do not justify the exclusion of the *Coitocoecum* from the Allocreadiidae, and has created a genus *Dactylostomum* under the Coitocoecinae. If the union of the caeca posteriorly should be a generic character in the case of the genus *Coitocoecum*, it becomes a question whether the family Opecoelidae Ozaki (1925) should be separated from the Allocreadiidae since the general shape, size of the body and the topography of the organs except the presence of anus are general characters of the Allocreadiidae. Odhner (1928) pointed out that *Opecoelus* Ozaki (1925) possessing an anus is closely related to the genus *Podocotyle* (Diesing) Odhner (1905) of the Allocreadiinae. Manter (1934) has created a genus *Opecoelina* with an anus under a sub-family Opecoelinae Manter of the Allocreadiidae, and pointed out the fact that *Opecoelina* with receptacle is closely related to *Opecoelus* and *Opegaster* Ozaki (1928)



of the family Opecoelidae Ozaki (1925). Ozaki (1928), suggesting the derivation of *Opecoelus* from a form similar to *Coitocoecum*, stated that the families Coitocaecidae, Opecoelidae and Allocreadiidae stand in close systematic relationship. It does not seem to be possible that the Opecoelidae should stand as a family while the *Coitocoecum* is included in the *Allocreadiidae*. La Rue (1926) has created a genus *Diploproctodaeum* with two anus for *Hemistomum haustrum* MacCallum (1919) and declined to give it any systematic position in a family without the information in regard to the life history for the similar trematodes. Regardless of these several opinions the validity of the families Coitocaecidae for *Coitocoecum* and Opecoelidae for *Opecoelus* cannot be confirmed without further information in regard to their life histories, respectively.

At the present time under the assumption that the absence of cirrus sac and cirrus are generic characters, it may be necessary to modify the definition of the Allocreadiinae in order to include those genera which have neither cirrus sac nor cirrus as is the case of *Genitocotyle*.

The numerous unicellular glands, especially numerous in the region of the acetabulum ventrally under the cuticula, may have a function to rebuild the cuticula continuously worn out due to the action of digestive secretion of the host.

57. Genitocotyle atlantica ~~n. sp.~~ MANTER, 1947

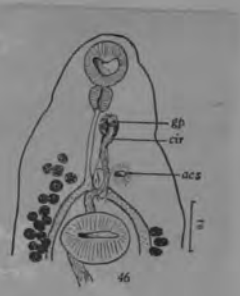
Figs. 45, 46

HOSTS: *Carapus bermudensis* (Jones); in 1 of 2 hosts examined. *Haemulon flavolineatum* (Desmarest), french grunt; type host; in 1 of 11 hosts examined. *Malacoctenus macropus* (Poey), blenny; in 2 of 10 hosts examined. *Opisthognathus* sp., jawfish; in 4 of 5 hosts examined. *Syngnathus robertsi* (Jordan & Rutter), pipefish; in 1 of 12 hosts examined.

LOCATION: Intestine.

Description: Body elongate, tapering equally toward each end, about equally wide along most of its length; 0.892 to 1.530 mm long by 0.280 to 0.345 mm wide. A specimen 0.660 mm long was immature. Cuticula smooth. Oral sucker usually slightly longer than wide, 0.064 to 0.120 mm in transverse diameter; acetabulum wider than long, 0.096 to 0.200 mm in transverse diameter; sucker ratio about 1:1.5 (range 1.45 to 1.8). Well developed transverse muscles of the body wall at anterior and at posterior border of acetabulum. Forebody about 1/4 body length. Accessory sucker inconspicuous, just to left of intestinal bifurcation, with ovoid opening and radiating muscles, without outer membrane. Very short prepharynx, pharynx 48 to 54 μ long by 43 to 48 μ wide; esophagus more than twice length of pharynx; intestinal bifurcation a short distance anterior to acetabulum; ceca ending blindly near posterior end of body. Genital pore slightly to left of midline opposite anterior end of esophagus. Testes two, tandem, close together just posterior to midbody, wider than long, outline slightly irregular to lobed. Posttesticular distance approximately the same as or slightly more than forebody length. Genital atrium muscular and surrounded by gland cells. Cirrus in the form of a short muscular ejaculatory duct; cirrus sac lacking; seminal vesicle a sinuous tube extending posterior to acetabulum about half-way to ovary. Ovary usually distinctly bilobed, sometimes indistinctly trilobed, directly pretesticular; shell gland large, anterior to ovary; seminal receptacle present; Laurer's canal opening dorsal to ovary; uterus preovarian; eggs yellow, 52 to 58 by 26 to 30 μ; vitelline follicles chiefly lateral to ceca from level of intestinal bifurcation to posterior end, forming two inter-cecal fields posterior to testes. The excretory vesicle extends to the ovary.

Discussion: The genus *Genitocotyle* Park, 1937 is related to the genera *Opecoeloides* Odhner, 1928 and *Anisoporus* Ozaki, 1928. All three genera agree in possessing a small accessory sucker anterior to the acetabulum. *Anisoporus* has acetabular papillae and an anus; *Opecoeloides* has acetabular papillae and a uroproct; *Genitocotyle* lacks acetabular papillae and the intestinal ceca end blindly.



Only one other species of *Genitocotyle* has been described, *G. acirrata** Park, 1937 from *Holconotus rhodoterus* on the California coast. *G. atlantica*

* Park's spelling, *acirrus*, should be changed to agree with the feminine *Genitocotyle*.

differs from *G. acirrata* chiefly in being about half as large, in its more pointed posterior end, in distribution of vitellaria anterior to acetabulum, and in more anterior genital pore more distant from the accessory sucker.

Genitocotyle **cablei** n.sp. NAHHAS AND SHORT, 1965

Figure 1

Host: *Ancylopsetta quadrocellata*
Site: intestine
Locality: Dog Island Reef
Holotype: U.S.N.M. No. 60082

APALACHEE BAY, GULF OF MEXICO

Description and measurements based on two specimens. Body elongated, 2.70-2.93 long, 0.567-0.600 wide. Oral sucker 0.165-0.185 in diameter; ventral sucker in anterior third of body, pedunculate, 0.268-0.294 in diameter, with three or four small papillae on anterior and posterior margins; sucker ratio 1:1.54-1.62. Accessory "sucker" pit-like and without a limiting membrane, surrounded by a few cells, about half-way between pharynx and ventral sucker. Prepharynx short, pharynx large, 0.155 in diameter; esophagus slender, 0.294-0.360 long, cecal bifurcation at level of anterior margin of ventral sucker; ceca ending blindly near posterior end of body. Testes two, smooth, tandem, close together, 0.232-0.309 in diameter. Cirrus sac absent; seminal vesicle tubular, reaching posteriorly halfway between ventral sucker and ovary; ejaculatory duct very long and slender, extending from posterior end of acetabulum to level of posterior margin of pharynx. Ovary entire, pretesticular, 0.155-0.180 in diameter; seminal receptacle absent; uterus preovarian; eggs 56-64 by 31-36 microns. Genital pore ventral, slightly sinistral, near level of posterior margin of pharynx. Vitelline follicles extending from level of posterior margin of ventral sucker to posterior end of body, confluent in posttesticular space. Excretory vesicle tubular, extending to ovary.

This species is referred to the genus *Genitocotyle* Park, 1937, on the basis of an accessory sucker (preacetabular pit) and blind ceca, conditions determined on live material as well as on frontal sections of one of the two specimens. Unlike other members in the genus, this species has acetabular papillae. We do not feel, however, that a new genus is justified on that basis.

Genitocotyle **cablei** differs from the other three species in the genus in having acetabular papillae. It further differs from *G. acirra* Park, 1937, in the position of the genital pore, in lacking a limiting membrane around the accessory sucker, and in having smaller eggs; from *G. atlantica* Manter, 1947, chiefly in extent of vitellaria and shape of the gonads, and from *G. heterostichi* Montgomery, 1957, in extent of vitellaria, position of the genital pore and seminal vesicle, and in lacking a limiting membrane around the accessory sucker. Neither the whole mount nor the frontal sections in our limited material show a true seminal receptacle. Such a structure is also reported as absent in *G. heterostichi* but present in the other two species. This structure is of generic value, at least in some opecoelids.

The species is named in honor of Professor R. M. Cable of Purdue University, Lafayette, Indiana, in recognition of his contributions to the knowledge of the Trematoda.

From Overstreet, 1969 ↓

Genitocotyle cablei Nahhas and Short, 1965

Host: *Hippocampus erectus* (3 of 4)*.
Site: Intestine.

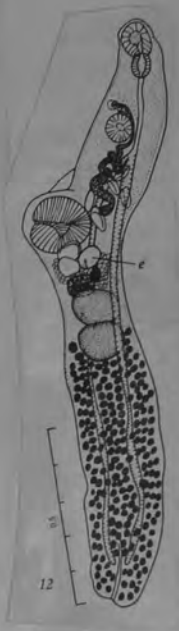
Discussion: Three specimens from *Hippocampus erectus* are identified as *Genitocotyle cablei* and provide the following measurements which extend the ranges of those in the original description: length, 1.4 to 3.4; width, 0.36 to 0.66; diameter of oral sucker, 0.13 to 0.21; diameter of acetabulum, 0.20 to 0.29; sucker ratio, 1:1.4 to 1.5; forebody, 20 to 29% of body length; pharynx, 0.11 to 0.18 long by 0.10 to 0.16 wide; esophagus longer or shorter than pharynx. Diameters of anterior testis 0.21 to 0.37, posterior testis 0.19 to 0.45, ovary 0.17 to 0.25. Eggs, 46 to 48 by 19 to 37 microns. The anterior extent of the excretory vesicle is not visible.

Genitocotyle cablei was previously known from *Ancylopsetta quadrocellata* in Apalachee Bay, Gulf of Mexico (Nahhas and Short, 1965:42).

Montgomery, 1957

Genitocotyle heterostichi n. sp.
(Figs. 12, 13)

Description (based on 20 specimens; measurements on 10: Body elongate, smooth, tapering anteriorly to terminal oral sucker, rounded posteriorly, 1.19–1.73 mm. long, 0.17–0.28 mm. wide; forebody 0.31–0.53 mm. long, post-testicular length 0.51–1.02 mm.; oral sucker 0.08–0.09 mm. long, 0.07–0.09 mm. in depth; acetabulum 0.14–0.17 mm. long, 0.14–0.17 mm. in depth; sucker length ratio 1: 1.8–1.91; accessory sucker to left of esophagus midway between oral sucker and acetabulum, 0.07–0.079 mm. in diameter, with a small round aperture but a well-developed cavity; prepharynx absent; pharynx 0.03–0.06 mm. long, 0.05 mm. in depth; esophagus 4–5 times length of pharynx, bifurcating immediately posterior to genital sucker; ceca reaching almost to posterior end of body, ending blindly.



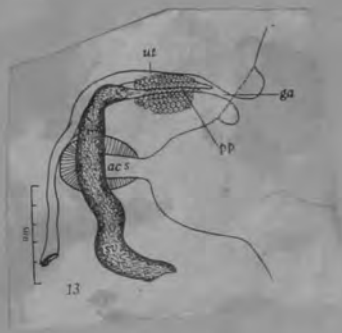
Genital pore submedian, to the left, immediately anterior to accessory sucker; testes two, tandem, contiguous, in close proximity to posterior edge of acetabulum, slightly wider than long; seminal vesicle tubular, reaching posteriorly to anterior border of acetabulum, coiled posterior to accessory sucker; *pars prostatica* with gland cells present; cirrus absent or weakly developed; cirrus sac lacking.

Ovary ovoid, immediately anterior to anterior testis; Laurer's canal opening dorsal to ovary; seminal receptacle lacking; vitellaria filling hindbody, extending to anterior edge of posterior testis; uterine coils anterior to ovary; eggs usually 6–12 in number, 66 μ–70 μ long × 45 μ–55 μ wide; excretory vesicle tubular, reaching to the level of posterior testis.

Host: *Heterostichus rostratus* Girard. Kelpfish, (Clinidae).

Location: Intestine.

Holotype: U. S. National Museum Helminthological Collection No. 38192.



Discussion: Two species have been described in the genus *Genitocotyle* Park, 1937: *G. acirrata* Park, 1937 and *G. atlantica* Manter, 1947. *G. heterostichi* differs from them in having a greater post-testicular length, about ½ of the body; seminal vesicle not extending posterior to the acetabulum; and vitellaria extending only to anterior edge of the posterior testis. *G. heterostichi* is like *G. acirrata* in having the genital pore close to the accessory sucker, and the forebody about ⅓ the length of the body.

The name *heterostichi* is for the host.

GENITOCOTYLE

Hamacreadium Linton, 1910

Syn. *Emmettrema* Caballero, 1946

Generic diagnosis. — Allocreadiidae, Allocreadiinae: Body more or less elongate, unarmed, with somewhat frilled lateral margins for hindbody. Oral sucker and acetabulum well developed, latter usually preequatorial. Pharynx comparatively large, longer than broad, esophagus short to moderately long, bifurcating some distance in front of acetabulum. Ceca terminating at posterior extremity. Testes oblique, toward middle of hindbody. Cirrus pouch claviform, mostly pre-acetabular, containing seminal vesicle, prostatic complex and protrusible cirrus. Genital pore median or a little to left, bifurcal or postbifurcal. Ovary lobed, in front of or opposite anterior testis a little to one side of median line. Receptaculum seminis present. Vitellaria extending along ceca from level of esophagus or intestinal bifurcation to posterior extremity. Uterus coiled between acetabulum and ovary or testes. Eggs not filamented. Excretory vesicle long, tubular, terminating behind intestinal bifurcation; flame cell formula: $2[(2+2) + (2+2)] = 16$ in *H. epinepheli*. Parasitic in intestine of marine fishes.

Genotype: ***H. mutabile*** Linton, 1910 (Pl. 10, Fig. 119; Pl. 14, Fig. 177), in *Neomoenis griseus, N. apodus, Anisotremus virginicus, Ocyurus chrysurus, Pomacanthus arcuatus;* Tortugas. Also in *Lutianus viridis* and *Mycteroperca xenarcha;* Galapagos. *Serranus, Lethrinus, Teuthis, Diacope;* Red Sea.

Cercaria (cercaria A of Miller, 1925) develops in sporocyst in ***Astraea americana***, encysts experimentally in *Haemulon, Neomoenis, Halichoeres* and *Sparisoma*, but not in small crabs or amphipods — McCoy (1929, 30).

Other species:

H. consuetum Linton, 1910, in *Haemulon plumieri* and *H. sciurus;* Florida.

H. epinepheli Yamaguti, 1934, syn. of *H. mutabile* — Nagaty (1941), Manter (1947), in *Epinephelus akaara, E. chlorostigma, Lethrinus haematopterus, Goniistius zonatus;* Inland Sea and Pacific coast of Japan, Okinawa.

H. gulella Linton, 1910, in *Neomoenis griseus, N. analis;* Florida. Additional hosts — McCoy (1930).

H. interruptum Nagaty, 1941, in *Lethrinus mehsenoides;* Red Sea.

H. lariosi (Caballero, 1946) [1]), syn. *Emmettrema l.* C., in an unidentified fish; Mexico.

[1]) From Caballero's photomicrograph (Fig. 2) it seems certain that the tubular excretory vesicle extends as far forwards as the testes, and probably beyond the acetabulum.

H. lethrini Yamaguti, 1934, in *Lethrinus haematopterus;* Pacific coast of Japan.

H. mehsena Nagaty, 1941, in *Lethrinus mehsena;* Red Sea.

H. morgani Raz, 1946, in *Pagrus vulgaris;* Egypt.

H. palleniscum (Shipley et Hornell, 1905), syn. *Distomum p.* S. et H., in *Balistes* sp.; Ceylon.

There is some doubt as to the generic assignment of *Hamacreadium oscitans* Linton, 1910, from *Haemulon plumieri, H. sciurus* and ***Anisotremus virginicus*** because of different extent of the vitellaria.

Genus HAMACREADIUM Linton, 1910, and Related Genera

The genus *Hamacreadium* was named by Linton in 1910 with *H. mutabile* as type species. The following additional species have been named: *H. gutella* Linton, 1910; *H. consuetum* Linton, 1910; *H. oscitans* Linton, 1910; *H. lethrini* Yamaguti, 1938; *H. epinepheli* Yamaguti, 1938; *H. mehsena* Nagaty,

* New host record.

1941; *H. interruptus* Nagaty, 1941. Nagaty (1941) considers *H. epinepheli* a synonym of *H. mutabile*.

Hamacreadium seems to differ from *Podocotyle* chiefly in that the testes are diagonal rather than tandem. This character would not ordinarily be generic but it seems to separate conveniently rather numerous species. *Podocotyle atherinae* Nicoll, 1914, named with some uncertainty, has diagonal testes but Palombi (1938a:376) considered it as an abnormal specimen of *P. atomon*. *P. breviformis* Manter, 1940 from *Anisotremus* sp. in the Galapagos Islands has diagonal testes. Restudy of cotype material shows that this species can not only be transferred to *Hamacreadium* on the basis of the diagonal testes but that thereupon it agrees very well with *Hamacreadium oscitans* from related hosts at Tortugas. Thus, at least for the present, diagonal testes seem to distinguish *Hamacreadium* from *Podocotyle*. *Podocotyle* species are further distinguished by a rather elongate body, the vitellaria do not extend anterior to the acetabulum, and the ovary is trilobed. *Hamacreadium oscitans* agrees with *Podocotyle* except its testes are diagonal and its body not elongate. It could be considered in either genus depending on the relative importance given to the vitellaria or to the diagonal testes. The excretory vesicle is short in some species of *Podocotyle* but in others it extends to the ovary; in *Hamacreadium* it is longer although in *H. oscitans* it ends near the acetabulum approximately at the level of the ovary.

Podocotyle shawi McIntosh, 1939 differs from all other species in anterior extent of the vitellaria, in the very long cirrus sac reaching to the ovary, and in its spined cirrus. These characters seem sufficient to exclude it from *Podocotyle*. Its long cirrus sac suggests the genus *Peracreadium* Nicoll, 1909, but *Peracreadium* has an unlobed ovary and median genital pore. A species very similar to *P. shawi* was named *Cainocreadium skrjabini* by Layman in 1930. It possesses the tandem testes, lobed ovary, long slender cirrus sac, spined cirrus, and a genital pore displaced to the right. Layman reports the anterior part of the body with small spines. This trematode does not seem to belong in *Cainocreadium* which is unspined, with unspined cirrus, median genital pore, and shorter cirrus sac. *Podocotyle fractum* (Rud., 1819) Stoss., 1898 from *Box salpa* (as illustrated by Timon-David, 1937) has anterior vitellaria but it differs greatly from *Podocotyle* in its elongate oral sucker and very long prepharynx and probably belongs in another genus as indicated by Odhner in 1905. It may possibly be related to the genus *Petalocotyle* Ozaki, 1934 which Ozaki (1937a) places in the family Gyliauchenidae.

The similarity of *Hamacreadium* to *Plagioporus* Stafford, 1904 (= *Lebouria* Nicoll, 1909) is even more confusing. The diagnoses of *Plagioporus* by Mueller (1934) and by Dobrovolny (1939) would include *Hamacreadium mutabile* but not the *Hamacreadium* species with a median genital pore. A genus can hardly be established on the basis of marine or freshwater hosts and a number of *Plagioporus* species have been named from marine fishes. Miller's (1940) redescription of *Plagioporus serotinus* Staff., 1904, the type species, shows this species to have the genital pore well to the left, vitellaria well anterior to acetabulum, tandem testes, unlobed ovary, and small sac-like

excretory vesicle. According to this species, the genus would seem to differ from *Podocotyle* in its anterior vitellaria and unlobed ovary; and from *Hamacreadium* in its tandem testes, unlobed ovary, shorter cirrus and genital pore well to the left. However, numerous species have now been named in *Plagioporus* and some of these such as *P. cooperi* Hunter & Bangham, 1932, *P. varia* (Nicoll, 1910), *P. japonicus* Yamaguti, 1938, and *P. branchiostegi* Yamaguti, 1938 have diagonal testes and a few, such as *P. choerodonis* (Yamaguti, 1931), *P. lobata* (Yamaguti, 1934) and *P. fusiformis* Price, 1934 have a lobed ovary. It might be noted that several species should be removed from *Plagioporus*. Linton's (1940) *"Lebouria truncata"* evidently lacks both a cirrus sac and a seminal receptacle. It has many features of *Horatrema*, and evidently should not be *Plagioporus*. Miller (1940) pointed out that *Plagioporus obducta* (Nicoll, 1909) Price, 1934 based on a *Distomum* species of Linton, 1904 could not be a species of *Plagioporus* because of its median genital pore. It also seems to lack a seminal receptacle and the presence of a cirrus sac is doubtful. *Plagioporus serratus*, Miller, 1940 has a spiny cuticula which strongly suggests some other family. It seems to belong in or near the genus *Astacotrema* Warren, 1903, a genus commonly classified in the Allocreadiidae but which may belong in the Lepocreadiidae. *Plagioporus crassigulus* (Linton, 1910) Price, 1934 and *Plagioporus gastrocotylus* Manter, 1940 are thick-bodied, muscular distomes probably related to the genus *Pycnadena*. All species of *Plagioporus* have vitellaria anterior to the acetabulum except *P. lepomis* Dobrovolny, 1939 and *P. virens* Sinitsin, 1931 which are much like *Podocotyle* except for the unlobed ovary.

As a rule *Hamacreadium* has a longer excretory vesicle than does *Plagioporus* but there is considerable variation among the described species and in some cases this character is not noted. At present, the genus *Hamacreadium* seems best distinguished by its diagonal testes together with a lobed ovary. In species of *Plagioporus* with a lobed ovary, the testes are tandem. Possibly other criteria might be more valid in separation of genera but they would entail considerable rearranging of specific names.

Superficially at least *Plagioporus* bears strong resemblance to the genus *Pycnadena* Linton, 1911 (= *Didymorchis* Linton, 1910), a genus classified in the Fellodistomatidae by Stunkard and Nigrelli (1930). Price's (1934) question of *Pycnadena's* place in the Fellodistomatidae and Yamaguti's (1938) placing of *Pycnadena* and *Pycnadenoides* Yamaguti, 1938 in the family Allocreadiidae illustrate difficulties involved by the similarities of the two families. In fact, judging from arrangement of reproductive organs, *Pycnadena* might well be considered a synonym of *Plagioporus*. However, after a study of several specimens of *Pycnadena lata*, I believe the genus should be considered in the family Fellodistomatidae. One of its chief fellodistomid characters is its broad, thick, robust body very different from the characteristically flattened allocreadiids or opecoelids. The excretory vesicle, not described by Linton, is short and almost Y-shaped (Fig. 76). Its large pharynx and very wide ceca also suggest fellodistomids. It is atypical of fellodistomids in its very extensive vitellaria; in that the uterus does not extend posterior to the testes; and in that the testes may be somewhat diagonal rather than symmetrical. The seminal vesicle is not clearly bipartite although prostatic glands

are well developed. A seminal receptacle, lacking in most fellodistomids, is known in some, for example in *Discogaster* Yamaguti, 1934 and *Parantorchis* Yamaguti, 1934. *Pycnadenoides* should also be considered in the family Fellodistomatidae.

61. Hamacreadium consuetum Linton, 1910

Host: *Haemulon plumieri* (Lacépède), common grunt; in 5 of 34 hosts examined; only 1 specimen in a host.

Location: Intestine.

Discussion: Linton reported this species from the above host and also from *Haemulon sciurus* (Shaw), the yellow grunt. It is distinguished from *H. gulella* by its more pointed posterior end, much smaller and relatively wider eggs, and the fact that the vitellaria do not extend very much median to the intestinal ceca. The genital pore is median; the testes unlobed; the excretory vesicle extends to the posterior edge of the acetabulum.

62. Hamacreadium gulella Linton, 1910

Hosts: *Lutianus griseus* (Linn.), gray snapper; in 2 of 24 hosts examined. *Lutianus analis* (Cuv. & Val.),* muttonfish, in 1 of 8 hosts examined.

Location: Intestine.

Discussion: Compared with *H. mutabile* this species is somewhat smaller, but size varies with age; the esophagus is shorter but varies with contraction; the genital pore is median; the cirrus sac is less at a diagonal angle; and the excretory vesicle reaches only to the level of the ovary. McCoy (1930) found differences in the cercariae of the two species. He reported adults from *L. griseus, L. apodus,* and *Ocyurus chrysurus.* Since *H. mutabile* may also sometimes have a median pore, identification may require knowledge of the extent of the excretory vesicle, a character usually evident only in sections. A few specimens sectioned suggest that in *H. mutabile* the cirrus sac curves around to become median whereas in *H. gulella* it extends straight to a median pore. Thus, the position of the genital pore together with the shape of the cirrus sac is probably diagnostic.

63. Hamacreadium mutabile Linton, 1910

Linton reported adults of this species from *Lutianus griseus* (Linn.), gray snapper; *Lutianus apodus* (Walbaum), schoolmaster; and *Anisotremus virginicus* (Linn.), porkfish. McCoy (1929, 1930) discovered the life cycle and found the adult developed in *L. griseus* and in *Ocyurus chrysurus* (Bloch), yellowtail but not in several fishes other than Lutianidae which were exposed. My collections are from *L. griseus,* in 13 of 23 hosts examined; *L. apodus,* in 4 of 19 hosts examined; and in addition from *Lutianus jocu* (Bloch & Schneider)*, a dog snapper; in 1 host examined; *L. analis* (Cuv. & Val.)*, muttonfish; in 3 of 8 hosts examined; and *L. synagris* (Linn.)*, Lane snapper; in 1 host examined. The species has been reported from related hosts in the Pacific (Manter, 1940) and in the Red Sea (Nagaty, 1941). Nagaty considers *H. epinepheli* Yamaguti, 1934 a synonym.

* New host record.

The name *mutabile* is even more appropriate than Linton realized. The genital pore apparently can vary in position from its usual location to the left of middle to be median or to the right. In some specimens it is only slightly sinistral. Nagaty found that in 34 specimens the pore was to the left in 21, median in 9, and to the right in 4. The testes are usually somewhat lobed or irregular in outline but may be smooth. The ovary shows from 3 to 11 lobes. In my specimens the vitellaria are more or less confluent anterior to the acetabulum but Nagaty found such may not always be the case.

64. Hamacreadium oscitans Linton, 1910

Synonym: Podocotyle breviformis Manter, 1940.*

This species was reported by Linton from *Haemulon plumieri* (Lacépède), common grunt; *H. sciurus* (Shaw), yellow grunt; and *Anisotremus virginicus* (Linn.), porkfish. I have collected it from these same hosts and in addition from *Haemulon carbonarium* Poey, Caesar or black grunt; in 1 of 2 hosts examined; and from *Brachygenys chrysargyreus* (Günther)**, bronze grunt; in 1 of 7 hosts examined.

This species is not common and only a few specimens were collected. It is easily recognized by its short plump body and vitellaria ending at the acetabulum. Linton did not observe the excretory vesicle which extends to the posterior border of the acetabulum. *H. oscitans* is a short-bodied species and the ovary comes to lie opposite the anterior testis and the uterus extends backward to the posterior edge of the anterior testis. The eggs are rather wide for their length. Two specimens in my collection have an unlobed ovary, and the number of lobes may vary from two to four.

II. Genus *Homoxeadium* Linton, 1910
syn. *Emmatrema* Caballero, 1946

Diagnosis : Plagioporinae : Body elongate, unspinulate. Oral sucker well developed. Acetabulum precquatorial. Pharynx large; oesophagus short or moderately long; caeca terminating at posterior extremity. Testes oblique, postequatorial. Cirrus sac claviform, mostly preacetabular. containing coiled seminal vesicle, prostatic complex and protrusible cirrus. Genital pore median or slightly sinistral, bifurcal or postbifurcal. Ovary lobed, in front of or opposite anterior testis, slightly submedian. Receptaculum seminis present. Vitellaria from level of oesophagus or intestinal bifurcation to posterior extremity. Uterus coiled, between acetabulum and ovary or testes, Eggs without filaments. Excretory vesicle long, tubular, reaching behind intestinal bifurcation.
Genotype : *H. mutabile* Linton.

Two Indian species, *H. Laipuri* Gupta, 1956 and *H. krusadaiensis* Gupta, 1956 are parasitic in the intestine of cat-fish near Krusadai Island, Indian Ocean.

FROM H.R. MEHRA (1966)

Allocreadiidae
Allocreadiinae

HAMACREADIUM Linton, 1910

Smooth, elongate, flattened allocreadids, without anus. Testes diagonal, usually smooth. Acetabulum simple. Ovary lobed, Seminal receptacle present. Genital pore usually median, sometimes slightly to the left. Excretory vesicle extending anterior to acetabulum. Cirrus sac with ovoid seminal vesicle, pars prostatica, and cirrus. No external seminal vesicle. Vitellaria well developed, extending anterior to acetabulum except in H. oscitans . Type: H. mutabile Linton, 1910 (first named)

Other species:

H. gulella Linton, 1910
H. consuetum Linton, 1910
H. oscitans Linton, 1910
H. lethrini Yamaguti, 1938
H. epinepheli Yamaguti, 1938
H. interruptus Nagaty, 1941
H. mehseena Nagaty, 1941

-OVER-

Genus: *Hamacreadium* Linton, 1910
Syn.: *Emmettrema* Caballero, 1946

The genus *Hamacreadium* was proposed by Linton in 1910 for four new species, viz. *Hamacreadium mutabile*, *H. gulella*, *H. consuetum* and *H. oscitans*. *H. mutabile* was recovered from the intestines of different marine fishes, namely *Neomaenis griseus*, *N. apodus*, *Anisotremus virginicus*, *Ocyurus chrysurus* and *Pomacanthus arcuatus*. The species *H. gulella* was found together with *H. mutabile* in the intestine of *Neomaenis griseus*, *H. consuetum* from the digestive tracts of *Haemulon plumieri* and *Haemulon sciurus*, and *H. oscitans* from the same hosts as of *H. consuetum*.

Yamaguti (1934) added two new species to the genus, namely *H. lethrini* from the stomach and intestine of *Lethrinus haematopterus* and *H. epinepheli* from the intestines of *Epinephelus akaara* and *Lethrinus haematopterus*. The hosts were obtained from the Inland Sea and Pacific coast of Japan. Nagaty in 1941 recorded two new species, *H. mehsena* and *H. interruptus*, the former from *Lethrinus mehsena* and the latter from *Lethrinus mehsenoides* of Red Sea. He also reported the occurrence of *H. mutabile* in five new fish hosts. He regarded *H. epinepheli* Yamaguti, 1934, as a synonym of *H. mutabile*. Baz (1946) found a new species, *H. morgani*, from the intestine of *Pagrus vulgaris* caught in the Mediterranean Sea. He considered the interruption of vitellaria as noticed by Nagaty (1941) in his new species as an unstable character. This inconstant feature as he further said might be the result of contraction and relaxation of one side of the parasite more than the other or the result of pressure exerted on it during the process of spreading and fixation.

Caballero in 1946 described a new species, *Emmettrema lariosi*, under the new genus *Emmettrema* from the large intestine of the host 'Mero' (an unidentified fish) obtained from the Pacific Ocean from Mexico. (This species has been transferred to the genus *Hamacreadium* Linton, 1910.) Yamaguti (1953) included also in the genus *Hamacreadium* the species *Distomum palleniscum* Shipley and Hornell, 1905, parasitic in *Balistes*. He made the genus *Emmettrema* a synonym of *Hamacreadium*.

FROM N. K. GUPTA, 1956

Hamacreadium mutabile Linton, 1910

Body long-oval; 2.30 and 3.02 mm., broadest and often emarginate at posterior end, tapering to anterior end; acetabulum usually about 1.5 X oral sucker; short prepharynx, esophagus long and slender. Genital pore a short distance anterior to acetabulum, on left of median line; cirrus sac cylindrical, inclosing seminal vesicle and lying on anterior border of acetabulum, often extending along the right border of acetabulum. Testes sometimes slightly lobed, or not (because covered by vitellaria ?), close together, diagonal, sometimes about halfway between acetabulum and posterior end, sometimes nearer posterior end. Ovary much lobed, in front of right testis; seminal receptacle on dorsal side of ovary. Vitellaria from neck a little in front of acetabulum to posterior end; uterus preovarian; eggs large, 78 by 51 μ; 75 by 34 μ. Excretory vesicle extending well anterior to acetabulum. McCoy (1929) worked out life cycle.

Linton (1910) reported from:
- Neomaenis griseus
- Neomaenis apodus
- Anisotremus virginicus

and immature from:
- Ocyurus virginicus
- Pomacanthus arcuatus

Manter (1940) reported from Galapagos from:
- Lutianus viridis
- Mycteroperca xenarcha

Nagaty (1941) reported from Red Sea from:
- Serranus merra
- Lethrinus mehsena
- L. nebulosus
- Teuthis marmorata
- Diacope fulviflamma

Manter (1940) and Nagaty (1941) report that the genital pore can be median, to the left or to the right. Most species of Hamacreadium have a median pore.

Hamacreadium mutabile Linton, 1910 (FIGURE 78)

Hosts: *Lutianus analis, Lutianus jocu, Lutianus griseus, Lutianus apodus, Ocyurus chrysurus.*
Site: intestine.
Localities: Parguera, Puerto Real, Punta Arenas, and Mayagüez, P. R.
Deposited specimen: No. 39354.

from Siddiqi and Cable, 1960

Fig. 1
Hamacreadium mutabile Linton, 1910. Dorsal view. Approx. X 34.

Hamacreadium mutabile Linton, 1910

Hosts.—*Epinephelus striatus* (Bloch), Nassau grouper [new host record]; *Haemulon sciurus* (Shaw), bluestriped grunt [new host record]; *Lutjanus synagris* (Linn.), lane snapper; *Petrometopon cruentatus* (Lacépède), graysby [new host record].

Location.—Pyloric ceca of *E. striatus*, *H. sciurus* and *P. cruentatus*, and pyloric ceca (immature) and whole length of intestine except rectum in *L. synagris*.

Locality.—*E. striatus* from Lerner Fish Pens, *H. sciurus* from N. shore N. Bimini; *L. synagris*, N. shore N. Bimini; and *P. cruentatus* from "Bimini vicinity", B.W.I.

Discussion.—I have studied the genital pore position of 23 specimens of *M. mutabile* from *Lutjanus griseus* from Tortugas (Manter Collection) and *Lutjanus synagris* from Bimini and find that 56.6 percent possess a sinistral genital pore and the rest, 43.5 percent, possess a median genital pore. Nagaty (1941) studied 34 specimens of this species and found a sinistral genital pore in 21, median genital pore 9, while 4 possessed a dextral genital pore.

This widely distributed trematode is found in many species of fishes.

sinistral dextral, 1959

Hamacreadium mutabile Linton, 1910
Hosts: *Lutianus apodus* (J); *L. griseus* (J); *L. jocu* (J). JAMAICA
Site: intestine.

FROM NAHHAS AND CABLE (1964)

Hamacreadium mutabile Linton, 1910

(Plate 40, fig. 64)

Hosts: *Lutianus viridis* (Val.)
Mycteroperca xenarcha Jordan (?)
Location: Intestine
Locality: Charles and Albemarle islands, Galapagos
Number: 3 from one Lutianus, 6 from Mycteroperca (?)

These specimens agree with *H. mutabile* Linton when the common but rather marked variations occurring within this species are considered. *H. mutabile* has been collected many times by the author at Tortugas, Florida, where it occurs in Lutianus and related hosts. The extent of the vitellaria is fairly constant. The follicles are confluent at the level of the intestinal bifurcation, especially dorsally, and extend approximately to mid-esophagus level. The lobing of the testes is highly variable and in a single collection of specimens may vary through all degrees from smooth to deeply lobed. The position of the genital pore is also variable. Usually well to the left, opposite the edge of the left cecum, it is apparently median in some specimens, otherwise in perfect agreement with *H. mutabile*. Both of these variations are unusual within a species of trematode. In fact, one of the 3 specimens in the present lot shows a genital pore almost median in position. The cirrus sac extends to the left but bends back medianly near its tip. When the cirrus sac is straight, the genital pore is to the left.

These variations arouse some question as to the validity of *H. epinepheli* Yamaguti, 1934 and *H. lethrini* Yamaguti, 1934. Specimens of *H. epinepheli* kindly sent to me by Yamaguti show the dorsal preacetabular confluency of the vitellaria. But the genital pore is constantly median and *H. epinepheli* may be a valid species. *H. lethrini* differs in the anterior extent of the vitellaria.

The specimens from *Mycteroperca xenarcha* (?) (the identification of the host is somewhat uncertain) all agreed in showing a short, narrow, and pointed posterior region of the body; but, since other details agreed with *H. mutabile*, the pointed posterior end is interpreted as an individual variation.

The genus Hamacreadium is so similar to Plagioporus (= Lebouria) and to Podocotyle that its validity might be questioned. Yamaguti emphasizes the anterior extent of the excretory vesicle. The median genital pore, although not constant in Hamacreadium, is usual, whereas it is never median in Plagioporus. The ovary is always lobed in Hamacreadium and rarely so in Plagioporus. In Podocotyle the testes are tandem (possible exception—*P. atherinae* Nicoll), the excretory bladder not anterior to the acetabulum, the vitellaria not anterior to the acetabulum, the genital pore to the left.

From Manter, 1940

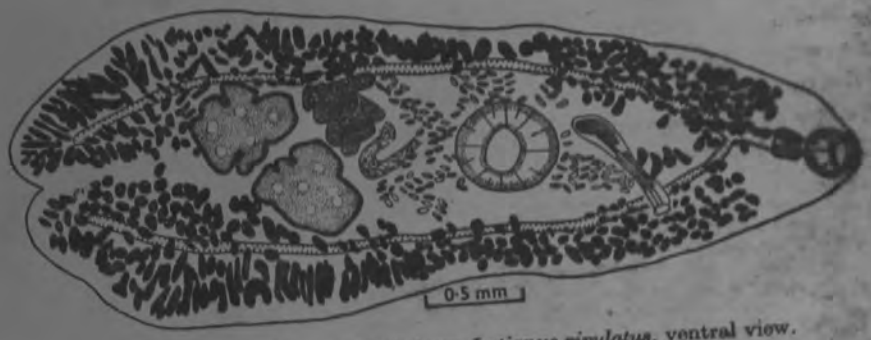


Fig. 6. *Hamacreadium mutabile* from *Lutianus rivulatus*, ventral view.

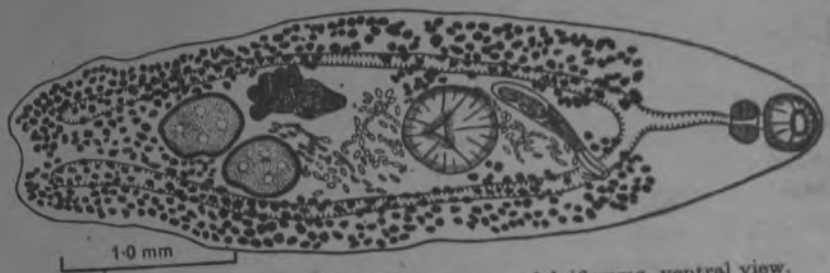


Fig. 7. *Hamacreadium mutabile* from *Lutianus fulviflamma*, ventral view.

Hamacreadium mutabile Linton, 1910 (Figs. 6, 7)

HOSTS AND LOCALITIES. ***Lutianus rivulatus* (Cuv.); blue-lined snapper; *Lutianidae; from Veraval**, Arabian Sea **Lutianus quinquelinearis* (Bl.); Moses perch; Lutianidae; from Karwar**, Arabian Sea **Lutianus fulviflamma* (Forskål); one spot golden snapper; Lutianidae; from Tuticorin**, Gulf of Manaar **Lethrinus frenatus* Val.; bridled pigface bream; Lethrinidae; from Tuticorin, Gulf of Manaar.

SITE. Intestine.

NUMBER OF SPECIMENS. 18.

DISTRIBUTION. Tortugas, Florida; Galapagos Island; Bimini, Bahamas; Puerto Rico; Red sea; Galeta point, Panama.

VARIATIONS. The specimens from *Lutianus rivulatus* have somewhat elongated rather than globular vitelline follicles which extend to the level of the pharynx. In those from *Lutianus quinquelinearis* the vitellaria do not reach the caecal bifurcation, the caecal arch is quite wide, in one of the three specimens the uterus becomes postovarian, and the excretory vesicle reaches the caecal bifurcation or slightly anterior to it. In all these specimens the genital pore is ventral to left caecum. Those from *Lutianus fulviflamma* and *Lethrinus frenatus* (both hosts collected from the same catch) have vitellaria to the caecal bifurcation, ovary trilobed to multilobed, genital pore lying a little lateral to the left caecum, and testes with a tendency towards lobation or indentation. Gupta's (1956) *Hamacreadium leiperi* having trilobed ovary and genital pore lateral to left caecum, falls well within these variations. Hence *H. leiperi* becomes a synonym of *H. mutabile*. Gupta collected his material from a 'marine catfish' which is rather unusual since almost all the species of *Hamacreadium* have been reported from lutianids, lethrinids or serranids.

From Hafeezullah (1971)

Table showing the measurements of the different organs of *Hamacreadium mutabile* Linton, 1910. *H. mehsena* n. sp. and *H. interruptus* n. sp.

(All measurements are in millimetres)

	Dissection number	Length	Maximum breadth	Diameter of ventral sucker	Diameter of oral sucker	Diameter of pharynx antero-post. x side to side	Diameter of anterior testis	Diameter of posterior testis	Diameter of ovary	Size of ova
Hamacreadium mutabile	3008	4.515	1.742	0.678	0.352	0.246 x0.158	0.722 x0.352	0.686x 0.334	0.264x 0.818	0.072-76x 0.045-50
	3009 (1)	3.655	1.41	0.528	0.308	0.18 x0.225	0.422 x0.37	0.537x 0.361	0.255x 0.431	0.063x 0.045
	3009 (2)	4.193	1.29	0.528	0.293	0.203 x0.23	0.484 x0.308	0.458x 0.405	0.194x 0.36	0.068x 0.045
	3010 (2)	4.408	1.591	0.554	0.329	0.225 x0.189	0.495 x0.409	0.495x 0.409	0.203x 0.405	0.068x 0.045
	3010 (3)	4.3	1.656	0.556	0.333	0.23 x0.23	0.502 x0.352	0.537x 0.44	0.255x 0.396	0.068x 0.045
	3021 (1)	2.903	1.067	0.458	0.293	0.185 x0.22	0.317 x0.229	0.308x 0.225	0.194x 0.326	0.072x 0.045
	3021 (2)	2.365	0.791	0.378	0.203	0.158 x0.135	0.315 x0.194	0.324x 0.225	saucer-shaped	0.072x 0.045
H. mutabile	3105	4.334	1.703	0.519	0.308 x0.352	0.229 x0.211	0.44 x 0.352	0.484x 0.396	0.258x 0.378	0.072x 0.05
	3111 (2)	5.311	1.871	0.792	0.44 x0.466	0.308 x0.264	0.44 x 0.264	0.484x 0.396	0.299x 0.317	0.063x 0.045
	3159 (3)	5.698	2.172	0.894	0.516	0.344 x0.258	0.44 x 0.44	0.352x 0.572	0.282x 0.326	0.072x 0.05
H. mehsena n. sp.	3018	2.94	1.22	0.51	0.326	0.203x 0.252	0.158x 0.257	0.203x 0.293	0.18 x 0.248	0.072x 0.05
H. interruptus n. sp.	3206 (1)	2.795	0.64	0.422	0.176x 0.246	0.132x 0.176	0.202	0.211	0.153x 0.171	0.077x 0.050
	3206 (2)	2.374	0.843	0.466	0.225x 0.27	0.134x 0.203	0.261	0.27	0.122x 0.18	0.068x 0.041
	3206 (3)	2.688	0.912	0.466	0.225x 0.293	0.140x 0.212	0.216	0.203	0.158x 0.198	0.072x 0.041
	3206 (4)	3.526	1.049	0.563	0.333x 0.428	0.22 x 0.246	0.299	0.299	0.202x 0.264	0.068x 0.050
	3206 (5)	3.075	1.066	0.59	0.315x 0.36	0.202x 0.23	0.326	0.326	0.22 x 0.308	0.068x 0.045

From Nagaty, 1941

Subfamily Plagioporinae

Hamacreadium mutabile Linton, 1910
(figs. 8 to 15)

Host.—*Ocyurus chrysurus* (Bloch); yellow-tail; family Lutjanidae.

Incidence of infection.—In 2 of 2 hosts.

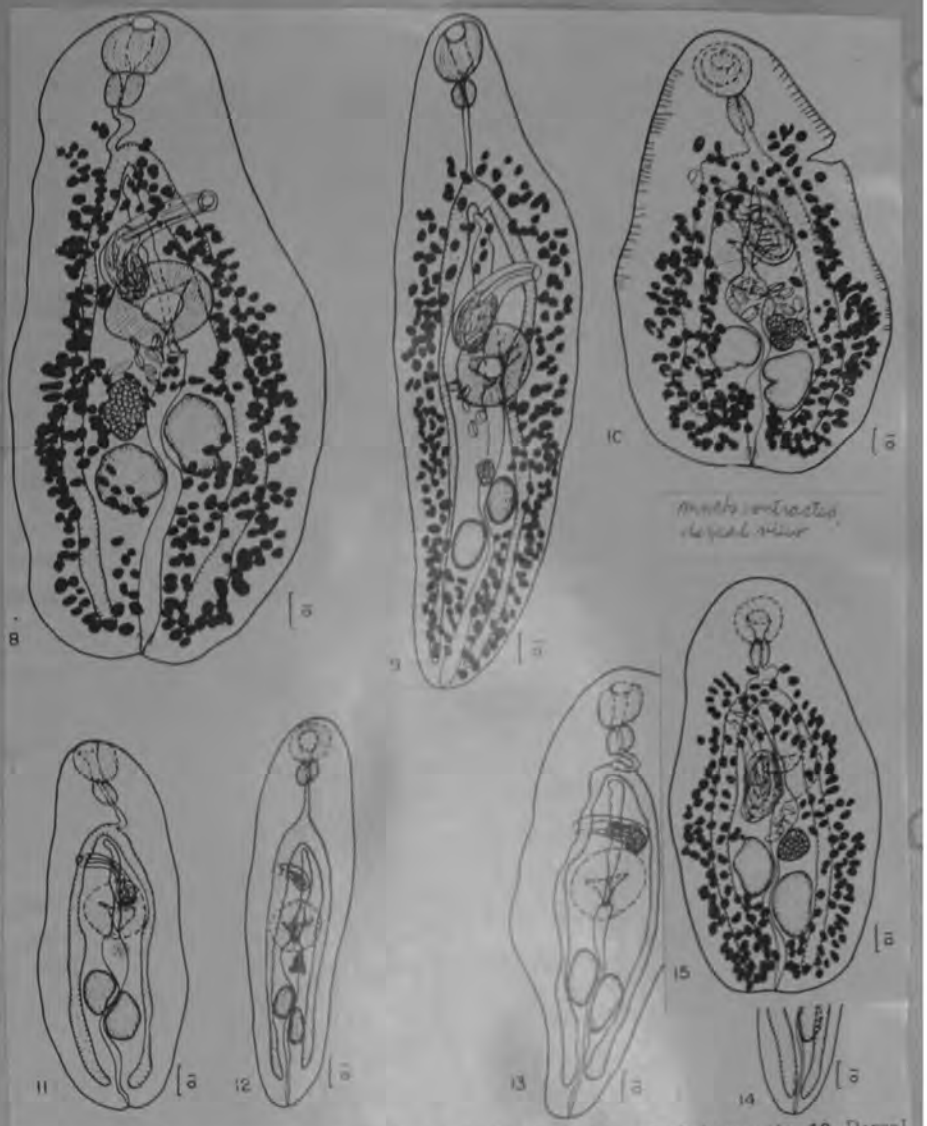
Location.—Intestine.

Locality.—Galeta Point, Republic of Panama [new locality record].

Discussion.—*Hamacreadium mutabile* was reported from *Lutjanus griseus* (Linn.), *L. apodus* (Walbaum), and *Anisotremus virginicus* (Linn.) at Tortugas, Florida by Linton (1910). While at Tortugas, McCoy (1929, 1930) experimentally obtained adults of *H. mutabile* from *Lutjanus griseus* and *Ocyurus chrysurus*. Manter (1947) also reported the following additional hosts for *H. mutabile* at Tortugas: *Lutjanus jocu* (Bloch and Schneider), *L. analis* (Cuv. and Val.), and *L. synagris* (Linn.). In another paper Manter (1940c) reported *H. mutabile* from *Lutjanus viridis* (Val.) and ? *Mycteroperca xenarcha* Jordan in the Galapagos Islands. Sogandares (1959) reported *H. mutabile* from *Epinephelus striatus* (Bloch), *Haemulon sciurus* (Shaw), *Lutjanus synagris*, and *Petrometopon cruentatus* (Lacépède) in Bimini, Bahamas. Siddiqi and Cable (1960) reported *H. mutabile* from *Lutjanus analis, L. jocu, L. griseus, L. apodus*, and *Ocyurus chrysurus* in Puerto Rico. They also described two new species, *Hamacreadium lintoni* from *Epinephelus striatus* and *Cephalopholis fulvus*, and *H. longisaccum* from *Epinephelus adscensionis* in Puerto Rico. The descriptions of *H. lintoni* and *H. longisaccum* both fall within the range of variation observed for *H. mutabile*. Furthermore, *H. mutabile* is known from *Epinephelus striatus* in Bimini, Bahamas. Nagaty (1941) reported *H. mutabile* from *Serranus merra* (Bloch) (= *Epinephelus merra*), *Lethrinus mahsena* Forsk., *L. nebulosus* Cuv. and Val., *Teuthis marmorata* Günther, and *Lutjanus fluviflamma* (Forsk.) (= *Diacope fluviflamma*) in the Red Sea. He also believed *Hamacreadium epinepheli* Yamaguti, 1934, from *Epinephelus akaara* Temm. and Schl. and *Lethrinus haematopterus* Temm. and Schl. in Japan, to be a synonym of *H. mutabile*.

H. mutabile has been reported from at least nineteen different host species of which about 42 percent are in the family Lutjanidae, 26 percent in the Serranidae, 15.7 percent in the Lethrinidae, 10.52 percent in the Pomadasyidae, and 5.25 percent in the Acanthuridae. The major host groups are the lutjanids, serranids and lethrinid fishes. The pomadasyids and acanthurids are possibly accidental hosts of *H. mutabile*, though the pomadasyids are related to the lutjanids, serranids and lethrinids.

Our specimens of *H. mutabile* have only slightly lobed or smooth testes and the ovaries are either smooth or deeply lobed (figs. 8-15). The cirrus sac does not overlap the acetabulum in one preadult (fig. 12) and usually comes into contact with or overlaps the acetabulum by about half its length in adults (figs. 8-10), and preadults (figs. 11, 13-14), extending to beyond the posterior border of the acetabulum in one adult contracted specimen (fig. 15). The genital pore position of our 12 *H. mutabile* specimens is sinistral. The esophagus varies considerably in length, depending mainly upon the degree of contraction of the forebody (figs. 8-15). The vitellaria of our specimens are almost always confluent in the region of the cecal bifurcation. The excretory vesicle usually extends to the cecal bifurcation.



Figures 8-14. *Hamacreadium mutabile*. 8, 9. Ventral views of whole mounts. 10. Dorsal view of much contracted specimen. 11-14. Ventral views of preadults showing variation in posterior extent of cirrus sac.

Yamaguti (1958) lumped several families of trematodes under the name Allocreadiidae. We are not following Yamaguti because the opecoelid trematodes, while showing similarities with adult allocreadiids, are a well defined group with corylomicrocercous cercariae. Also, we are not entirely in agreement with the more recent views of Dollfus (1960) who split the Opecoelidae into several families. The more conservative views of Manter (1947) and of Cable (1956) are followed here.

Hamacreadium mutabile Linton, 1910

Host: *Lethrinus* (?); "sabutu" or "damu"; Lethrinidae.

Location: Intestine.

Discussion: A single specimen was available. Because of its large size and unusual proportions, the following measurements are given. Length 6.137; width 1.805; oral sucker 0.348; acetabulum 0.603; sucker ratio 1:1.73; forebody 2.432; prepharynx 0.094; pharynx 0.234 long, 0.268 wide; esophagus 0.435; posttesticular space 1.843; eggs 59 to 68 by 29 to 34 μ.

Of 41 specimens of *H. mutabile* from various fishes at Tortugas, Florida, most are only 2 or 3 mm long but one measured 5.1, and Nagaty (1941) records one 5.698 long. All the Tortugas specimens showed the uterus entirely anterior to the anterior testis except one in which it reached to the middle of the testis, whereas in the Fijian specimen the uterus extends medianly to the posterior edge of the testis. All of the Tortugas specimens had a short posttesticular space (except one in which the ratio to body length was 1:4), whereas in the Fijian specimen this space was great (1:3.3 body length).

The Fijian specimen is considered to be *H. mutabile* because it agrees in such details as sucker ratio, egg size, location of genital pore, extent and details of cirrus sac, extent of vitellaria, and extent of excretory vesicle. The differences noted above are such as might accompany a greater age, indicated by the small size of the testes.

H. mutabile is known from the Caribbean, Galápagos Islands, and the Red Sea.

From Manter, 1963

Hamacreadium mutabile Linton, 1910

Hosts and localities: *Lutjanus* sp.; Lutjanidae; "anglais"; New Caledonia. *Lutjanus amabilis* (De-

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Vis); New Caledonia and Heron Island, Queensland, Australia. *Lutjanus fluviflamma* (Forskål); Moreton Bay, Australia. *Lethrinus miniatus* Forskål; Lethrinidae; New Caledonia.

Remarks

Hamacreadium mutabile has been reported from at least five species of *Lutjanus*, as well as from other genera of fishes, in several parts of the world including the Caribbean, Galápagos Islands, Hawaii, and the Red Sea.

A study of numerous specimens of *H. mutabile* from the Caribbean leads us to conclude that the genital pore is never median in this species (or in this genus; see *Cainocreadium* p. 751).

Durio & Manter, 1968,

Hamacreadium mutabile Linton, 1910

Hosts: *Lutjanus griseus* (1 of 3); *Lutjanus synagris* (1 of 7).

Site: Pyloric caeca and stomach.

Overstreet, 1969

tion, 1910; Vista Verde: -OJEE

Hamacreadium mutabile Linton, 1910.
Hospedador: *Epihephelus labriformis* (Jenyns) Serranidae.
Hábitat: Intestino.
Localidad: Puerto Angel, Oaxaca, México.
Número de ejemplares: 10 en un hospedero.
Ejemplares: Depositados en la Colección Helmintológica del Instituto de Biología de la Universidad Autónoma de México con el número 223-18.

Discusión: Esta especie, estudiada por varios autores, ha sido objeto de especial interés por las variaciones morfológicas que presenta. Manter (1940) señala que las modificaciones por él encontradas respecto a la extensión de las vitelógenas, a la lobulación de los testículos y a la posición del poro genital, son muy variables; estas variaciones demostraron la validez de *H. epinepheli* Yamaguti, 1934, y *H. lethrini* Yamaguti, 1934 que muestran caracteres más constantes; sin embargo, los especímenes encontrados por Manter (1940) en *Mycteroperca xenarcha*, muestran el extremo posterior terminado en punta, carácter que este autor considera como una variación individual más que un carácter específico. Nuestros ejemplares presentan este carácter en forma muy notable y coinciden, además, con los otros caracteres de la especie.

Nagaty (1941) encontró que de 34 especímenes examinados de esta especie, en 21, el poro genital se encontraba a la izquierda, en 9 en la parte media y en sólo 4 a la derecha. Sogandares Bernal (1959) estudiando la posición del poro genital en 23 especímenes, tanto de su colección como de la colección del Dr. Manter, encontró que en 56.6% el poro genital se encontraba situado a la izquierda, y en el resto, en un 43.4%, estaba sobre la línea media. En todos nuestros ejemplares el poro genital se encuentra situado a la izquierda de la línea media.

HOSPEDADORES DE *HAMACREADIUM MUTABILE* LINTON, 1910

Hospedador	*Familia*	*Localidad*	*Autor*	*Año*
1. Anisotremus virginicus	Pomadasydae	Golfo de México	Linton	1910
2. Diacope fluviflamma	Lutjanidae	Mar Rojo	Nagaty	1941
3. Epinephelus labriformis	Serranidae	Pacífico	Lamothe	1967
4. Epinephelus striatus	Serranidae	Atlántico	Sogandares	1959
5. Haemulon sciurus	Pomadasydae	Atlántico	Sogandares	1959
6. Lethrinus mehsena	Lethrinidae	Mar Rojo	Nagaty	1941
7. Lethrinus nebulosus	Lethrinidae	Mar Rojo	Nagaty	1941
8. Lethrinus sp.	Lethrinidae	Pacífico	Manter	1963
9. Lutjanus analis	Lutjanidae	Golfo de México	Manter	1947
		Atlántico	Siddiqi y Cable	1960
10. Lutjanus apodus	Lutjanidae	Golfo de México	Linton	1910
		Golfo de México	Manter	1947
		Atlántico	Siddiqi y Cable	1960
		Atlántico	Nahhas y Cable	1964
11. Lutjanus griseus	Lutjanidae	Golfo de México	Linton	1910
		Golfo de México	McCoy	1929, 1930
		Golfo de México	Manter	1947
		Atlántico	Siddiqi y Cable	1960
		Atlántico	Nahhas y Cable	1964
12. Lutjanus jocu	Lutjanidae	Golfo de México	Manter	1947
		Atlántico	Siddiqi y Cable	1960
		Atlántico	Nahhas y Cable	1964
13. Lutjanus synagris	Lutjanidae	Golfo de México	Manter	1947
		Atlántico	Sogandares	1959
14. Lutjanus viridis	Lutjanidae	Pacífico	Manter	1940
15. Mycteroperca pardalis	Serranidae	Golfo de Cortés	Bravo y Manter	1940
16. Mycteroperca xenarcha	Serranidae	Pacífico	Manter	1940
17. Ocyurus chrysurus	Lutjanidae	Golfo de México	McCoy	1929, 1930
		Atlántico	Siddiqi y Cable	1960
18. Petrometropodon cruentatus	Serranidae	Atlántico	Sogandares	1959
19. Serranus merra	Serranidae	Mar Rojo	Nagaty	1941
20. Teuthis marmorata	Acanthuridae	Mar Rojo	Nagaty	1941

Opecoelidae

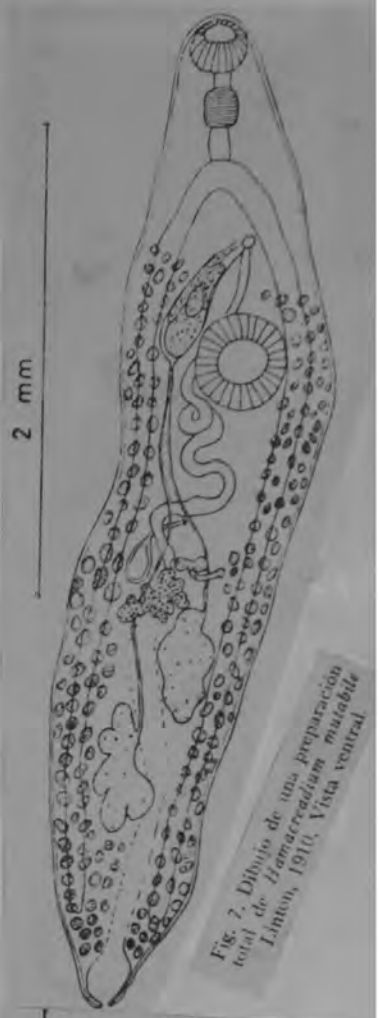


Fig. 7. Dibujo de una preparación total de *Hamacreadium mutabile* Linton, 1910. Vista ventral

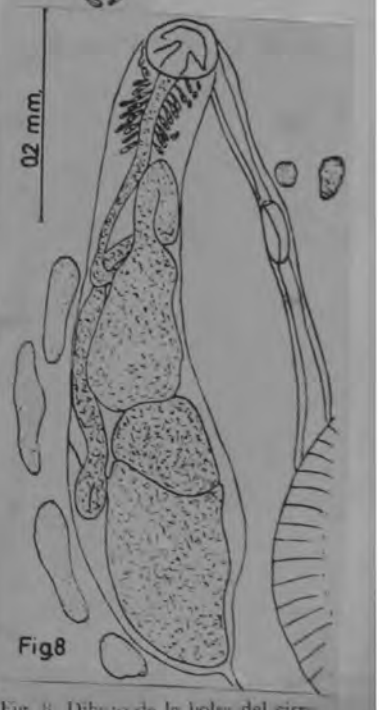


Fig. 8. Dibujo de la bolsa del cirro de *Hamacreadium mutabile* Linton, 1910. Vista ventral

-over-

Manter (1947) registra tres nuevos hospedadores para esta especie en aguas de Tortugas, Florida. Bravo y Manter, (1957) señalan un nuevo hospedador, *Mycteroperca pardalis,* de la Paz, Baja California, en el Golfo de California. Sogandares Bernal (1959) señala la presencia de esta especie en tres nuevos hospedadores de Bimini, en las Indias Británicas Occidentales. Siddiqi y Cable (1960) se encontraron la misma especie en cinco hospedadores ya conocidos en Puerto Rico, y Nahhas y Cable (1964) la vuelven a encontrar en tres de los mismos hospedadores, pero en aguas del Caribe en Jamaica.

Esta es la cuarta ocasión que esta especie se registra en las aguas del Pacífico, pero en un nuevo hospedador, *Epinephelus labriformis,* de Puerto Angel, Oaxaca, México.

A continuación doy un cuadro con hospedadores, familias, localidades, autores y años en que ha sido encontrado *Hamacreadium mutabile* Linton, 1910.

FROM LAMOTHE, 1969

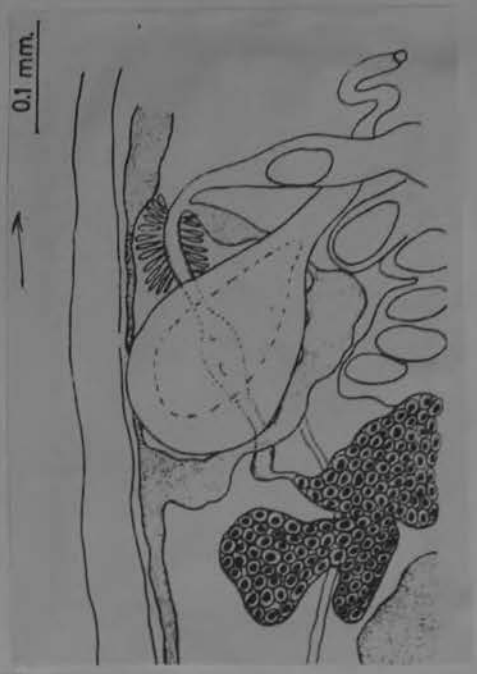


Fig. 9. Dibujo del complejo reproductor femenino de *Hamacreadium mutabile* Linton, 1910. Vista ventral.

Hamacreadium balistesi ~~n. sp.~~ NAGATY AND ABDEL AAL, 1962
LOCALITY: GHARDAGA, RED SEA

(Fig. 1)

Two specimens obtained from **Lethrinus nebulosus** locally called "Sho-ora" and one specimen from **Balistes aculeatus** locally called "Hegman", description based on the two mature specimens only. Body smooth without spines or scales, elongate 3.45 and 4.80 long; 0.95 and 1.37 wide, nearly cylendrical, rounded at both ends. Oral sucker slightly subterminal 0.24 and 0.38 by 0.27 and 0.41. Pharynx well developed 0.14 and 0.21 by 0.18 and 0.24. Esophagus 0.17 by 0.12 with esophageal glands around. Intestinal ceca terminating near posterior end of body; 0.6 from posterior extremity. Ventral sucker 0.38 and 0.56 by 0.41 and 0.51, in second quarter of body length; 0.78 and 0.84 from oral sucker. Ratio of oral to ventral suckers 0.7 :1.

Testes ovoid, left 0.38 by 0.23 and 0.27, more anterior than the right 0.38 and 0.45 by 0.24 and 0.27; they are obliquely situated, in third quarter of body length. Cirrus pouch preacetabular 0.35 by 0.08, curved with protrusible cirrus. Genital opening overlapping left cecum, postbifurcal.

Fig. 1: *Hamacreadium balistesi* n. sp. FIG.1

Ovary four lobed 0.20 and 0.23 by 0.26 and 0.29, submedian; immediately anterolateral to right testis. Vitellaria composed of nummerous small follicles extending anteriorly from just behind pharynx or intestinal bifurcation and may be interrupted at acetabular zone, becoming more densely towards posterior extremity. Uterus occupies area anterior to testes and posterior border of acetabulum. Eggs oval, averaging 0.07 by 0.04.

of with *H. magnyi*

Comparisons:

This species resembles closely *H. interruptus* Nagaty, 1941, but differs from it in having: (1) esophagus straight instead of being S-shaped; (2) vitelline follicles constantly arranged or may be interrupted at acetabular level instead of their constant interrupted arrangment; (3) testes ovoid instead of being spheroid and (4) cirrus sac preacetabular, small, slightly curved towards left side with protrusible cirrus instead of being large and transversely situated at anterior border of acetabulum with vesicula seminalis interna.

Hamacreadium **confusum** sp. n.
Figure 21 Overstreet, 1969

Hamacreadium mutabile Linton, 1910, of Siddiqi and Cable, 1960 (in part).

Host: Ocyurus chrysurus (1 of 5), type host.

Site: Intestine.

Holotype: U. S. N. M. Helm. Coll. No. 71306.

Description (based on 2 mature and 2 immature specimens from Biscayne Bay and Puerto Rico): Body elongate, rounded at both ends, usually with a slight constriction at acetabular level, 1.2 to 2.2 long by 0.45 to 0.71 wide at level of anterior portion of acetabulum; hindbody slightly wider. Oral sucker subterminal, 0.14 to 0.17 long by 0.14 to 0.18 wide. Acetabulum 0.23 to 0.26 long by 0.22 to 0.29 wide, at or near equatorial level. Sucker ratio 1:1.4 to 1.7. Forebody 36 to 44% of body length. Prepharynx 0.02 to 0.05 long. Pharynx 0.06 to 0.12 long by 0.08 to 0.11 wide. Esophagus 0.06 to 0.16 long. Intestinal bifurcation usually nearer oral sucker than acetabulum. Caeca epithelial, terminating near posterior end.

Testes slightly irregular, diagonal, contiguous or separated; left testis anterior, 0.20 to 0.28 long by 0.17 to 0.19 wide; right testis 0.19 to 0.33 by 0.17 to 0.28. Posttesticular space 9 to 13% of body length. Genital pore sinistral, close to or ventral to caecum, about midway between intestinal bifurcation and acetabulum. Cirrus sac arcuate, terminating posteriorly at anterior border of acetabulum; containing large, folded seminal vesicle, short tubular prostatic vesicle, prostatic cells, and short muscular cirrus.

Ovary dextral to median, lobed; usually 6 secondary lobes. Seminal receptacle in contact with ovary. Vitelline follicles extending from midesophageal or postpharyngeal level to posterior end, slightly confluent anteriorly. Uterus preovarian. Eggs thin-shelled, 72 to 85 by 43 to 49 microns.

Excretory vesicle extending to ovarian zone; pore terminal, sphincter present.

Discussion: One specimen with two eggs and one with none, both from *Ocyurus chrysurus* and slightly contracted, were lent by Dr. R. M. Cable and used in the above description. Of the four specimens, the smallest contains two eggs and all have well-developed organs, so the immature specimens are included in the description. All are similar to *Hamacreadium mutabile* and *Cainocreadium gulella* from related hosts. In fact, Siddiqi and Cable (1960:297) identified their specimens as *H. mutabile*, but they differ from that species in that the excretory vesicle extends to the ovarian level only, rather than beyond the acetabulum. Yamaguti (1934:310-311) mentioned the taxonomic importance of the extent of the vesicle in *H. mutabile*. Because *C. gulella* has a median genital pore, Durio and Manter (1968:751) transferred that species from *Hamacreadium* to *Cainocreadium*. The present species is the only one in *Hamacreadium* reported to possess a short excretory vesicle. Of the several species for which the extent of the vesicle is unknown, *H. confusum* is distinguished from *H. diacopae* Nagaty and Abdel Aal, 1962, and *H. leiperi* Gupta, 1956, by the lobated ovary; from *H. balistis* Nagaty and Abdel Aal, 1962 (originally *H. balistesi*), by the uninterrupted vitellaria; and from *H. morgani* Baz, 1946, primarily by the size. The latter is 5.7 to 7.3 long and probably a synonym of *H. mutabile*.

Figure 21. *Hamacreadium confusum*, holotype, ventral view.

Linton, 1910

Hamacreadium consuetum gen. et sp. nov. (Figs. 56-59.)

Body ovate, flattened, oral sucker subterminal, pharynx adjacent to oral sucker; esophagus usually as long as pharynx or longer; intestinal rami extend to the posterior end of the body; ventral sucker 1.5 times the diameter of the oral sucker, or more. Neck approximately one-third the entire length. Reproductive aperture median, immediately behind the bifurcation of the intestines. Cirrus-pouch overlaps anterior edge of ventral sucker, or it may pass for a short distance to one side, usually the right, but it was not seen to reach as far as the middle of the ventral sucker. The seminal vesicle and prostate gland are both inclosed in the cirrus-pouch. Testes 2, oval, one diagonally behind the other on opposite sides of the median line, about midway between the ventral sucker and the posterior end. Ovary lobed, somewhat variable, near anterior border of posterior testis, with the oval seminal receptacle on its dorsal surface, in some cases extending much beyond the anterior border of the ovary. Vitelline glands diffuse, along margins as far forward as the pharynx. Folds of the uterus between the testes and the ventral sucker. The metraterm passes to the left of the cirrus-pouch to the genital aperture; ova relatively large with a tubercle at one pole.

The principal variations noted in the distomes referred to this species were in the position of the cirrus-pouch and in the outlines of the ovary. The cirrus-pouch in worms which were well extended lay in front of the ventral sucker with the posterior end but slightly overlapping. In those which were more or less contracted the cirrus-pouch lay at one side of the anterior border of the ventral sucker, but did not extend as far as the middle of that organ. The ovary is sometimes difficult to make out on account of the dense masses of yolk-gland which often overlie it. In some it appeared to be bilobed, but usually deeper focussing or viewing from the opposite side brought another lobe into view. In one specimen there were as many as 5 lobes visible. The seminal receptacle is dorsal to the ovary, as shown in the figure, and extends much in advance of the ovary. This was the case in the 5-lobed ovary.

Some are much more broadly ovate than the one shown in fig. 56. This was particularly true in specimens from *Hæmulon sciurus*. In these, moreover, the ovary, while lobed, had a tendency to be elongated and to lie with its long axis inclined to the axis of the body. In some the testes are relatively nearer the posterior end than they are in the one figured.

Mounted specimens, with ova, vary from 0.77 to 1.61 mm. in length.

Dimensions of specimen in balsam: Length 1.55; breadth 0.46; oral sucker 0.15; pharynx 0.06; ventral sucker 0.27; ova 0.052 by 0.039; length of neck 0.56.

This species was found in the following hosts:

Host, *Hæmulon plumieri:*

1906, July 5, 6 fish, few distomes; July 13, 2 fish, 1 distome; July 15, 1 fish, 1 distome.

1907, July 3, 16 fish, few distomes; July 12, 12 fish, few distomes.

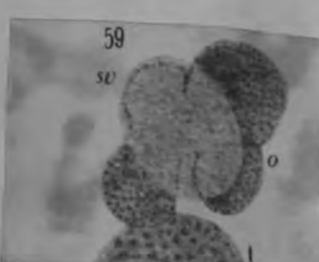
1908, July 9, 3 fish, 3 distomes.

Host, *Hæmulon sciurus:* 1908, July 5, 6 fish, few distomes.

Dimensions, life, flattened: Length 1.37; breadth 0.63; oral sucker 0.17; pharynx 0.06; ventral sucker 0.32; ova 0.051 by 0.034.

Dimensions, life, of a specimen from *H. plumieri:* Length 1.90; breadth 0.70; oral sucker 0.22; pharynx 0.08; ventral sucker 0.36; ova 0.051 by 0.034.

all 3 specimens in my collection have ♀ pore slightly but definitely to the left.



ut post to ov.
cf H. lethrini ♀ N...
No gp med here H. lethrini ♀ F+K 64
H. mutabile ♀ HWM 63

-over-

Hamacreadium diacopae ~~sp. n.~~ NAGATY & ABDEL AAL, 1962
(fig. 4)

Description based on whole mount of one specimen from *Diacope fulviflama* locally called "hebra." Body 2.18 long, 0.92 wide, narrow anteriorly, broad posteriorly; cuticle smooth. Oral sucker subterminal 0.23 by 0.20. Prepharynx 0.09 long, pharynx well developed, 0.08 by 0.09, esophagus 0.23 long, narrow, slightly sinuous. Intestinal ceca ending blindly 0.30 from posterior end of body. Ventral sucker 0.42 by 0.40; in third quarter of body length, 0.80 from oral sucker. Ratio of oral to ventral suckers 0.5:1.

Testes intercecal, smooth, ovoid, 0.29 by 0.20, almost diagonal; in posterior third of body length. Cirrus sac well developed lying obliquely a short distance anterior to acetabulum, overlapping left cecum, and containing vesicula seminalis. Genital pore extracecal, on left at level of intestinal bifurcation.

Ovary 0.15 by 0.17, consists of four compact lobes, submedian, on right, anterior to posterior testis, just within posterior third of body. Receptaculum seminis 0.09 by 0.05, oval, lateral to ovary. Vitellaria composed of numerous small follicles, partly extra- and partly intercecal, from esophageal level to posterior end of body. Uterus preovarian, mostly anterior to midlevel of acetabulum. Eggs few, oval, averaging 0.06 by 0.05.

Comparisons: This species resembles *H mutabile* Linton, 1910, but differs from it in having: (1) cirrus sac a short distance anterior to acetabulum and obliquely situated instead of extending to acetabulum, and (2) genital pore to the outside of left cecum instead of lying towards the outer border of ceca.

Diacope = Lutianus

also in Lethrinus sp.
New Caledonia
NC95a

Hamacreadium diacopae Nagaty and Abdel Aal, 1962

Host: *Lethrinus* sp.; Lethrinidae; "bec de cane."
Location: Intestine.
Number: 3 from 1 host.

Remarks New Caledonia
Durio & Manter, 1968

This species was named for specimens from *Diacope* (= *Lutjanus*) *fluviflamma* in the Red Sea. The testes in our specimens vary from diagonal to symmetrical in position. The seminal receptacle is immediately preovarian in two specimens, lateral to the ovary in one specimen.

Hamacreadium interruptus Nagaty, 1941

Hamacreadium interruptus n. sp.

The following description of this species is based on five mature and four immature specimens obtained from nine *Lethrinus mehsenoides*, locally called "mehsena," from Ghardaga (dissection no. 3206).

The anterior end of this trematode is distinctly narrower than the rest of the body which possesses more or less parallel sides and a rounded posterior end. The cuticle is not armed with spines or scales. The size of this trematode varies between 2.374 and 3.526 mm. in length and 0.64 and 1.066 mm. in breadth. The ventral sucker is situated in the second quarter of the body, is large in comparison to the oral sucker and measures 0.422 to 0.59 mm. in diameter. It is roughly triangular in outline and possesses a crescentic aperture and a Y-shaped lumen.

The digestive system : The oral sucker is well developed and is at the extreme anterior end ventrally. It measures 0.176 to 0.333 mm. antero-posteriorly and 0.246 to 0.428 mm. from side to side; the latter diameter is always greater than the former in the specimens examined. A well developed muscular pharynx is situated close to the oral sucker and measures 0.132 to 0.22 mm. antero-posteriorly and 0.176 to 0.246 mm. in diameter from side to side; the former diameter is always smaller than the latter. The pharynx is followed by an S-shaped oesophagus. The two intestinal caeca are simple straight tubes that reach the posterior end of the body.

The male genitalia are composed of two smooth-contoured spheroid testes which are obliquely situated in the third quarter of the body, the left is always in advance of the right. The former testis measures 0.202 to 0.326 mm. and the latter 0.203 to 0.326 mm. in diameter. The cirrus sac is large and transversely situated at the anterior border of the ventral sucker and opens on the left side external to the intestinal caecum of this side. The vesicula seminalis is inside the cirrus sac.

The female genitalia : The ovary is composed of four lobes or at most five and is situated anterior to the right testis and close to the left in the median plane of the body or slightly to the right of this. It measures 0.122 to 0.22 mm. in lesser diameter and 0.171 to 0.308 mm. in greater diameter. The vitellaria are composed of small spheroid follicles that are aggregated in two sets, a posterior and an anterior, with a wide gap between the two. The posterior set extends from the posterior end of the body to the posterior border of the ventral sucker both ventrally and dorsally. They extend laterally external to the intestinal caeca and coalesce behind the

Fig. 3
***Hamacreadium interruptus* n. sp.**
Ventral view. Approx. X 40

According to Fischthal and Kuntz (1965):

Hamacreadium interruptus
syn. Plagioporus (P.) longivesicula
{ Hamacreadium lethrini of Nagaty & AA (nec Yam)
= H. nagatyi
= H. lenthrium

No question about the Borneo specimens being H. longivesicula n comb but whether these = the

-OVER-

Hamacreadium interruptus Nagaty, 1941

(Fig. 5)

SYNONYMS: *Plagioporus* (*Plagioporus*) *longicesicula* Yamaguti, 1952; *P.* (*Paraplagioporus*) *longivesicula* Yamaguti, 1952; *Hamacreadium lethrini* Nagaty and Abdel Aal, 1962; *H. nagatyi* Lamothe, 1962, and *H. lenthrium* Manter, 1963 (both nom. nov. for *H. lethrini* Nagaty and Abdel Aal, 1962, nec Yamaguti, 1934).

HOSTS: *Lethrinus microdon* (Lethrinidae); *Fluta alba* (Flutidae).

HABITAT: Small intestine.

LOCALITY: Jesselton, North Borneo.

DATE: 29 August 1960.

SPECIMENS: U.S.N.M. Helm. Coll. No. 60076 (six slides with one specimen each from *L. microdon*); No. 60077 (one specimen from *F. alba*).

MEASUREMENTS AND SOME PERTINENT DATA (based on 24 specimens from *L. microdon* and 1 from *F. alba*, 8 measured): Body 2,575 to 4,924 by 798 to 1,419; preoral body 6 to 26 long; forebody 767 to 1,442, hindbody 1,396 to 2,891; oral sucker 221 to 348 by 254 to 366, usually wider than long; acetabulum 412 to 591 by 435 to 721, wider than long; sucker length ratio 1 : 1.43 to 2.05; prepharynx 18 to 37 long; pharynx 147 to 202 by 166 to 228, wider than long; esoph[agus] 110 to 243 in longitudinal extent; excr[etory] bladder extending to just postbifurcal, bifu[rcate] or slightly prebifurcal, connecting to excret[ory] pore by short, narrow canal bearing bulb[ous] muscular sphincter; testes smooth in 14, slig[htly] lobed in 3, and anterior testis smooth w[ith] posterior slightly lobed in 3; anterior [testis] testis 236 to 445 by 258 to 414; post[erior] (right) testis 287 to 544 by 261 to [414]; acetabulum to anterior testis 210 to 537; posterior testis 350 to 767; posttesticular sp[ace] 760 to 1,580, ratio to body length 1 : 3.1 to 3.8; cirrus sac 331 to 614 (longitudinal exte[nt]) by 118 to 243, thin walled, commencing inter[cecally] at level of anterior one-seventh to three-fifths of acetabulum from midline of latter to beyond its right margin, transverse to oblique in position, curving to left, containing a long seminal vesicle with single long loop near distal end, a short, slightly muscular, cell-lined pars prostatica surrounded by prostate cells, and a short, muscular, protrusible cirrus; distinct pars prostatica visible or not depending on particular mount; genital atrium shallow; genital pore 81 to 314 preacetabular, opening sinistrally from midway between body midline and cecum to midway between cecum and body margin; intercecal in 4, cecal in 9, extracecal in 7; ovary 177 to 376 by 221 to 335, usually wider than long, two-lobed in 1, three-lobed in 13, four-lobed in 6, 155 to 331 postacetabular; seminal receptacle present; Laurer's canal not observed; vitellaria commencing slightly pre-bifurcal in 10 and bifurcal in 10, extending 243 to 583 preacetabular, interrupted at acetabular level on both sides in 12, on left side only in 4, on right side only in 1, and uninterrupted on both sides in 3, lateral fields separate preacetabular but confluent posttesticular in 8 of 20 specimens; metraterm muscular, thick walled, shorter than cirrus sac; gland cells surrounding distal ends of metraterm and cirrus sac; 24 partially collapsed eggs measuring 54 to 68 by 32 to 41.

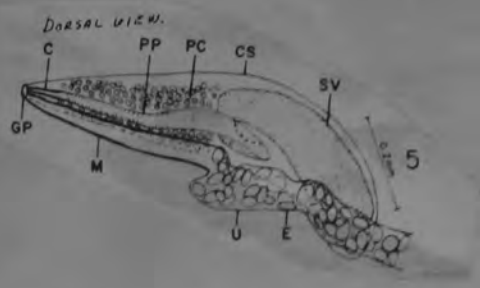


Fig. 5

DISCUSSION: Manter (1947) indicated great similarity between *Hamacreadium* Linton, 1910, and *Plagioporus* Stafford, 1904. He compared the two as follows: "As a rule *Hamacreadium* has a longer excretory vesicle than does *Plagioporus* but there is considerable variation among the described species and in some cases this character is not given. At present, the genus *Hamacreadium* seems best distinguished by its diagonal testes together with a lobed ovary. In species of *Plagioporus* with a lobed ovary, the testes are tandem."

Hamacreadium interruptus was described by Nagaty (1941) from *Lethrinus mahsenoides* from the Red Sea, and distinguished from all known species of the genus by the "constant interrupted arrangement of the vitelline follicles." Nagaty and Abdel Aal (1962) described a new species, *H. lethrini*, from a single specimen from the same host species and locality; Lamothe (1962) noted that the latter was a homonym of *H. lethrini* Yamaguti, 1934, and renamed it *H. nagatyi*; Manter (1963), unaware of the latter change, renamed it *H. lenthrium*. *H. nagatyi* was separated from *H. interruptus* by Nagaty and Abdel Aal in possessing a small oral sucker not occupying most of the body width, an oblique rather than a transverse cirrus sac, and vitellaria that were not interrupted. The variations in our specimens readily include the characteristics cited above for both these species. Therefore, we declare *H. nagatyi* a synonym of *H. interruptus*. We also declare *Plagioporus* (*Plagioporus*) *longicesicula* described by Yamaguti (1952) from *Lethrinus* sp. from Celebes and transferred by Skrjabin and Koval (1958) to the subgenus *Paraplagioporus* Yamaguti, 1939, a synonym of *H. interruptus* inasmuch as it readily fits the descriptions of the latter species given by Nagaty (1941) and by us. The specimen from the freshwater host, *Fluta alba* (syn. *Monopterus a.*), could not be distinguished from the specimens, especially those with uninterrupted vitellaria, from the marine host, *Lethrinus microdon*. In view of the many variations noted for *Hamacreadium mutabile* Linton, 1910, by Nagaty (1941), Sogandares and Sogandares (1961), and Manter (1963), it may be that *H. interruptus* as herein defined is a synonym. However, before we can be certain direct comparisons and more significantly additional life history studies of these species are needed.

6 Feb 63

25 Feb 63

ventral

FROM FISCHTHAL AND KUNTZ (1965)

Hamacreadium koshari NAGATY AND ABDEL AAL, 1962

(Fig. 3a and 3b)

LOCALITY: GHARDAGA, RED SEA

Description based on whole mounts of 8 specimens. 6 from *Serranus* sp. locally called "koshar", 2 from *Lethrinus mehsena* locally called "mehsena". Worms elongate 1.40-2.91 long and 0.60-1.35 wide, narrow anteriorly and broad posteriorly, without scales or spines. Oral sucker subterminal 0.14-0.30 by 0.15-0.36. Pharynx well developed, longer than broad 0.14-0.24 by 0.11-0.21. Esophagus elongate 0.24-0.27, in specimens obtained from *Serranus* sp. esophagus fairly short and curved under pharynx and intestinal bifurcation. Intestinal ceca terminating blindly near posterior extremity. Ventral sucker 0.27-0.48 by 0.35-0.53 partly overlapping ceca, nearly in middle third of body length; 0.15-0.78 from oral sucker. Ratio of oral to ventral suckers 0.6:1.

Testes intercecal, smooth, spheroid 0.12-0.30 by 0.14-0.21 obliquely situated, left testis in advance of right, nearly in third quarter of body length. Cirrus sac well developed, containing vesicula seminalis, extending just behind acetabulum. Genital pore submedian postbifurcal towards outside.

Ovary four lobed, submedian, anterior to posterior testis 0.14-0.18 in diameter in middle third and anterior part of posterior third of body length. Receptaculum seminis small and lateral to ovary. Vitellaria composed of small or large numerous follicles partly extra- and partly intercecal, may overlapping part of testes and ovary, extending from posterior border of acetabum to posterior extremity. Uterus occupying small area anterior to ovary and anterior testis to postacetabular zone. Eggs oval averaging 0.065 by 0.040.

Comparisons

This species resembles *H. mehsena* Nagaty, 1941, but differs from it in (1) shape of body as the interior end narrow instead of being broad; (2) in position of genital pore and (3) size of ova and disposition of vitellaria.

(over)

1. *Hamacreadium koshari* NAGATY and ABDEL AAL, 1962 from Pritchard 1966

Though named as a species of *Hamacreadium*, this species lacks vitellaria in the forebody and is more appropriately considered together with the *Podocotyle*-like species. It should be noted that NAGATY and ABDEL AAL's (1962) Figs. 3a and 3b which purport to be the same species show specimens in which the sucker ratios are 1 : 3 and 1 : 1.4 respectively. Ordinarily there is not so much variation within a species and it is probable that two species are represented.

Their Fig. 3a represents a species that would be closely related to *Podocotyle serrani* NAGATY and ABDEL AAL, 1962 (nec YAMAGUTI, 1952) if the ovary were rounded rather than lobed. Furthermore, both are from a serranid species called "koshar" collected at Ghardaga, Red Sea. *Podocotyle serrani* NAGATY and ABDEL AAL, 1962, has been considered a synonym of *Allopodocotyle epinepheli* (YAMAGUTI, 1942) (see p. 167 of this paper).

The specimen in their Fig. 3b appears to have a shorter cirrus sac, and if the ovary is lobed as described, it is very similar to *Apopodocotyle bongosi* (NAGATY and ABDEL AAL, 1962) mihi, differing only in a slightly more sinistral genital pore.

Hamacreadium krusadaiensis n.sp. (Fig. 4) N. K. GUPTA, 1956

One specimen only of *Hamacreadium krusadaiensis* n.sp. was found in the intestine of a marine cat-fish collected from the Gulf of Manaar. It is a small worm of 1·19 mm. in length and 0·52 mm. in breadth across the region of the testes. The cuticle is non-spinous. The oral sucker, 0·1×0·12 mm. in size, is subterminally placed. The prepharynx is apparently absent. The muscular pharynx is spherical and measures 0·06×0·064 mm. The œsophagus is 0·034 mm. long and 0·019 mm. broad. The intestinal caeca are densely covered with vitellaria and so their extent in the hinder region is obscured.

The ventral sucker is strongly developed and it measures 0·19×0·27 mm. It is more than double the size of the oral sucker.

The two testes, very close to each other, are somewhat obliquely placed one behind the other in the anterior part of the second half of the body. The anterior testis is 0·1×0·14 mm. in size, while the posterior testis is 0·16×0·17 mm. The cirrus sac is an elongated structure, posteriorly it extends up to the anterior one-third of the ventral sucker. The vesicula seminalis is coiled. The prostate glands are scanty. The genital pore lies to the left of the median line, close to the pharynx and in front of the intestinal fork.

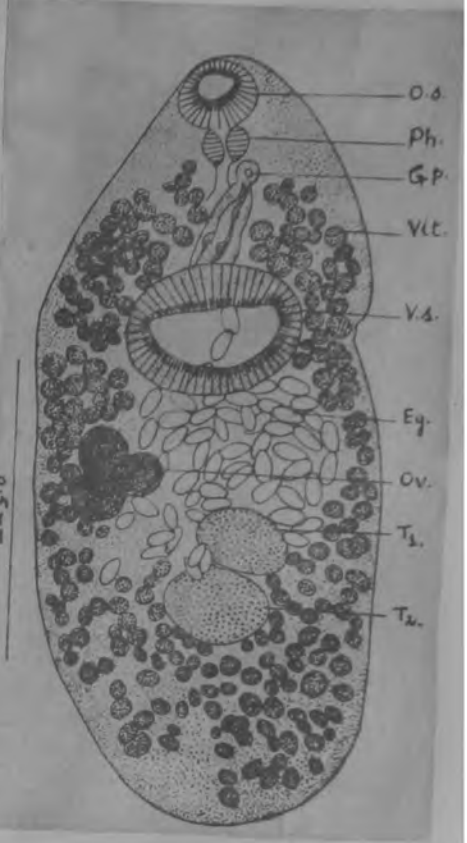
The ovary is trilobed, the lobes are extended like the petals of a flower. Of the lobes, one is directed to the left and the other two to the right. It is situated to the right of the median line and ventral to the right intestinal caecum. It measures 0·16×0·12 mm. The Mehlis' gland complex and the receptaculum seminis are hidden by the vitellaria. The uterus extends posteriorly up to the second testis, while anteriorly it runs dorsal to the ventral sucker and through metratum it opens at the genital pore. The vitelline follicles extend laterally from the level of the base of the pharynx up to the posterior extremity of the body. Both in the post-acetabular and pre-acetabular regions the vitellaria of both sides become confluent.

The eggs measure 0·053–0·06×0·026–0·038 mm.

Relationships:—The new species *Hamacreadium krusadaiensis* is characterised by having a trilobed ovary. Therefore in this character it differs from the following species, *H. mutabile* Linton, 1910, *H. gulella* Linton, 1910, *H. consuetum* Linton, 1910, *H. oscitans* Linton, 1910, *H. epinepheli* Yamaguti, 1934, *H. lethrini* Yamaguti, 1934, *H. mehsena* Nagaty, 1941, *H. interruptus* Nagaty, 1941, *H. morgani* Baz, 1946 and *H. lariosi* (Caballero, 1946). In this character it resembles *H. palleniscum* (Shipley and Hornell, 1905) and *H. leiperi* n.sp. It, however, stands apart from all of them in the position of the genital pore which in the new species, *H. krusadaiensis*, lies to the left of the median line, in front of the intestinal fork and close to the pharynx. It further deviates from *H. leiperi* in the ratio between the diameters of the oral and ventral suckers, size of the body and the eggs.

The new species has been named after the place from the vicinity of which its host was caught and dissected.

Host: Marine cat-fish.
Location: Intestine.
Locality: Gulf of Manaar (India).



location & anat. rec.?

move to

Compare this with *Emmettrema lariosi* Caballero, 1946 (esp. ut.)

Hamacreadium krusadaiensis Gupta, 1956 (Fig. 8)

HOST. **Lethrinus frenatus* Val.; bridled pigface bream; Lethrinidae.

SITE. Intestine.

NUMBER OF SPECIMENS. 2.

LOCALITY. Tuticorin**, Gulf of Manaar.

DISTRIBUTION. Krusadai Island, Gulf of Manaar.

Two specimens of this species 0·776–1·329 mm long, 0·342–0·588 mm wide, were recovered with the specimens of *Hamacreadium mutabile* from the above host fish. The smaller specimen is not in good condition and can be studied only partially. The width ratio of the suckers is 1:1·88–2·5; ovary trilobed; anteriorly the vitellaria stop behind caecal bifurcation; the testes are wedge-shaped and measure 137–263; the eggs are 66–70 × 44–53, and are not seen in the postovarian region. Gupta found this species also from an 'unidentified marine catfish' from the Gulf of Manaar.

From Hafeezullah, (1971)

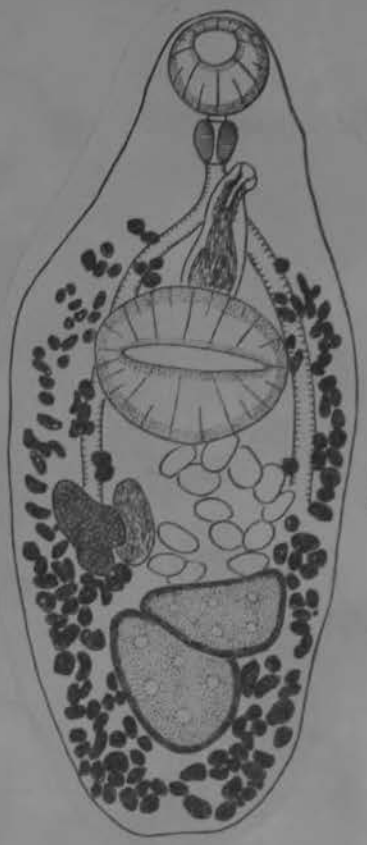


Fig. 8. *Hamacreadium krusadaiensis*, ventral view.

Hamacreadium leiognathi sp. nov. (Fig. 9) Hafeezullah, 1971

HOST. *Leiognathus daura* (Cuv.); golden striped ponyfish; Leiognathidae

SITE. Intestine.

NUMBER OF SPECIMENS. 7.

LOCALITY. Karwar, Arabian Sea.

DESCRIPTION (with measurements on three good specimens). Body 1·506–1·741 mm long, 0·353–0·435 mm wide at testicular level, elongate, tapering anteriorly, rounded posteriorly. Cuticle unarmed. Eye-spot pigment absent. Acetabulum 152–205 × 161–208, spherical, pre-equatorial. Oral sucker 87–111 deep, 161–190 wide, terminal; mouth terminal. Width ratio of suckers 1:1–1·2. Prepharynx indistinct, pharynx 58–73 × 65–78, globular; oesophagus 170–225 long; caecal bifurcation almost halfway between pharynx and acetabulum; caecae ending a little short of posterior end of body.

Testes 184–263 × 131–187, slightly lobed, diagonal with left one more anterior, in posterior third of body. Cirrus sac very long, extending well posterior to acetabulum, containing coiled, tubular seminal vesicle; *pars prostatica* with prostatic gland cells, ejaculatory duct and cirrus. Genital pore postbifurcal, sinistral, lying ventral to left caecum or lateral to it.

Ovary 2–4 lobed, right of median line, postequatorial, pretesticular. Seminal receptacle antero-dorsal to ovary. Laurer's canal undetermined. Vitellaria follicular, from level of caecal bifurcation or slightly anterior to it to posterior end of body, discontinuous on left side in acetabular zone at least in holotype; vitelline reservoir anterior to ovary. Uterus scanty, proximal coils filled with sperms, becoming postovarian in posterior extent; metraterm indistinct. Eggs 75–90 × 56–66. Excretory vesicle tubular, extent undetermined; excretory pore subterminal, dorsal, with sphincter.

Hamacreadium leiognathi is the only species so far in this genus which has a terminally located disk-like oral sucker with terminal mouth, together with a cirrus sac extending posteriorly beyond the acetabulum, a character sometimes exhibited by *H. mutabile* Linton, 1910. In possessing postovarian uterine coils it resembles *H. lariosi* (Caballero, 1946) Yamaguti, 1953. This character is variable in *H. mutabile* and *H. krusadaiensis* Gupta, 1956. The new species is distinguished from *H. lariosi* in that the uterine coils do not lie between the two testes, in the posterior extent of the cirrus sac, and in the smaller sucker ratio; from *H. krusadaiensis* it is distinct in having a disk-like terminal oral sucker, a more elongate body, a much smaller sucker ratio, in the postacetabular extent of the cirrus sac, and in the multilobed ovary and the prebifurcal genital pore.

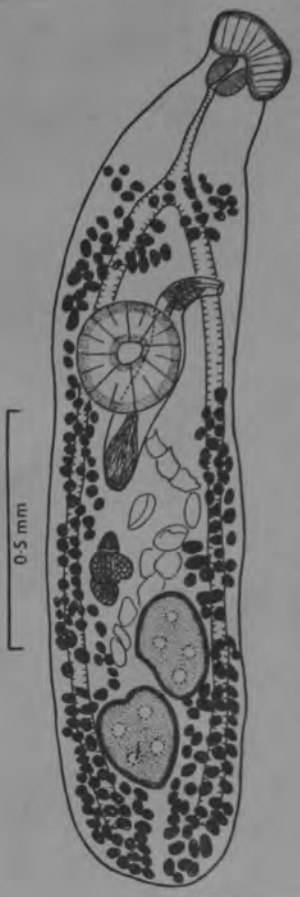


Fig. 9. *Hamacreadium leiognathi*, ventral view of holotype.

Hamacreadium leiperi n. sp. (Fig. 3) N. K. Gupta, 1956

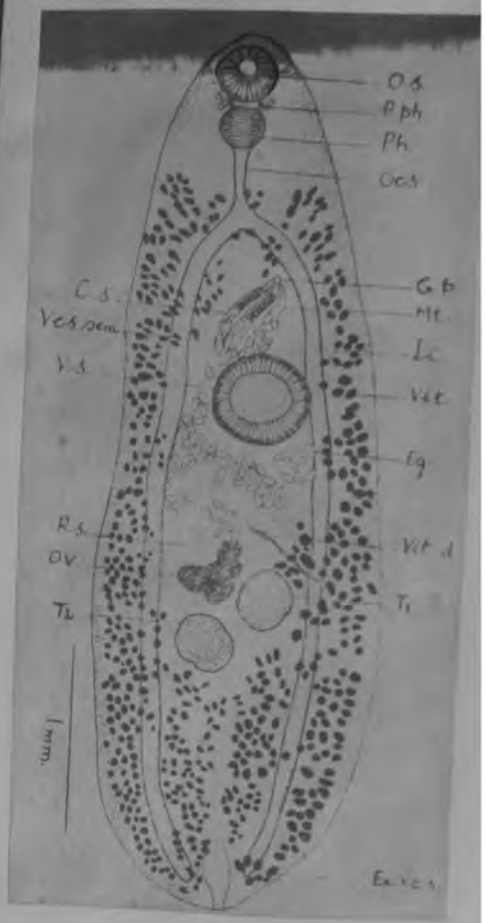
Two specimens of *Hamacreadium leiperi* were found in the intestine of a marine cat-fish dissected at Krusadai Island. The live worm is of whitish appearance. The body is flat and elongated and measures 5·2–5·5 mm. in length and 1·48–1·58 mm. in maximum breadth, which occurs across the testicular region. The cuticle is smooth without any spines or armature. The oral sucker is somewhat spherical, subterminal and measures 0·28×0·3–0·33 mm. The prepharynx is quite distinct and is crossed by the commissure of the brain ganglia. The pharynx, 0·16–0·19 mm. long and 0·17–0·22 mm. broad, is a muscular organ and lies behind the prepharynx. The oesophagus is moderately long having a width of 0·09–0·09 mm. and length of 0·2–0·33 mm. The two intestinal caeca run parallel to each other along the lateral sides towards the posterior end of the body where they terminate at about 0·14–0·16 mm. in front of it. The intestinal fork is 0·62–0·72 mm. in front of the ventral sucker. The ventral sucker is larger than the oral sucker and lies in the posterior region of the first half of the body. It measures 0·28–0·54 mm. in longitudinal axis and 0·48–0·54 mm. transversely.

The testes are spherical or ovoid with smooth or slightly indented margins and are situated obliquely in the middle of the post-acetabular region. The anterior testis is to the left of the median line, close to the left intestinal caecum and measures 0·29–0·31×0·24–0·29 mm. The posterior testis is 0·33×0·25–0·29 mm. and is adjacent to the right intestinal caecum. From anterior aspect of each testis, the vasa efferentia run forward and meet at the base of the cirrus pouch to form the vas deferens. The cirrus pouch is well developed and lies obliquely in front of the ventral sucker. It measures 0·48–0·57 mm. in length and 0·14–0·16 mm. in maximum breadth. It encloses the coiled seminal vesicle, pars prostatica and the ejaculatory duct. The genital pore lies to the left of the median line much behind the intestinal fork and opens a little inward to the intestinal caecum.

The ovary is trilobed. It measures 0·2×0·3 mm. and is situated in front of the posterior testis and to the right of the anterior testis. All the three organs, namely two testes and the ovary, are arranged in a triangle. The Mehlis' gland complex is just in front of and adjacent to the left lobe of the ovary. The receptaculum seminis is to the right of the Mehlis' gland complex and anterior to the ovary. The vitellaria consist of small follicles which extend from the posterior end of the body to the level of the oesophagus and laterally external to the intestinal caeca. In the post-testicular region the vitellaria of the two sides coalesce medially and are densely congregated. In the pre-acetabular zone a few of the vitellaria invade the intercaecal zone. The uterus is confined to the pre-testicular region. While ascending, it first runs along the left intestinal caecum, then it takes a turn to the right, running along the intestinal caecum. It again bends to the left to run along the cirrus pouch and open at the genital pore through the metraterm. The eggs measure 0·074–0·076×0·04–0·053 mm.

The excretory vesicle is I-shaped and its opening lies in the middle of the posterior end of the body.

Relationships:—In having a trilobed ovary, the new species *Hamacreadium leiperi* differs from *H. mutabile* Linton, 1910 and *H. lariosi* (Caballero, 1946) in which the ovary is much lobed; from *H. gulella* Linton, 1910, *H. consuetum* Linton, 1910, *H. oscitans* Linton, 1910, *H. mehsena* Nagaty, 1941, *H. interruptus* Nagaty, 1941 and *H. morgani* Baz, 1946, in which the ovary is either tetra- or penta- or hexa-lobed or tetra- to penta-lobed or penta- to hexa-lobed, and from *H. lethrini* Yamaguti, 1934 and *H. epinepheli* Yamaguti, 1934, which have irregularly lobed ovaries.



—OVER—

The new species further deviates from *H. gulella*, *H. consuetum* and *H. epinepheli* in which the genital pore is median in position; from *H. mehsena*, *H. oscitans* and *H. lariosi* in which the genital pore lies at the intestinal bifurcation; from *H. lethrini* and *H. morgani* in which the genital pore is ventral to the left intestinal caecum; and from *H. interruptus* which has its genital pore external to the left intestinal caecum. In *H. lethrini* the vitellaria stop short of the intestinal fork, the cirrus pouch extends behind up to the middle of the ventral sucker, in *H. mehsena* and *H. oscitans* the vitellaria extend up to the region of the ventral sucker; therefore, in these respects too, *H. leiperi* n.sp. stands apart from them. In the position of the genital pore, the new species resembles *H. pallenisce* (Shipley and Hornell, 1905) but it is also different from it in the extent of the vitellaria and the cirrus sac and in the shape of the ovary.

The new species has been named after Professor R. T. Leiper.

Host: Marine cat-fish.

Location: Intestine.

Locality: Gulf of Manaar (India).

Allocreadiidae
Allocreadiinae

Hamacreadium lethrini Yamaguti, 1934

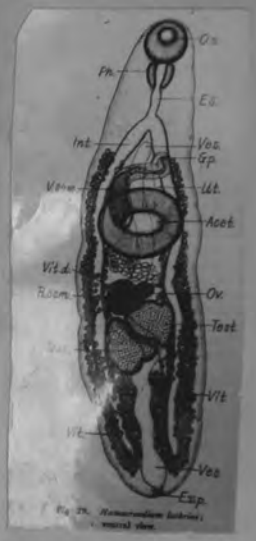
Hamacreadium lethrini n. sp.

Specific Diagnosis. *Hamacreadium* Linton, 1910; with generic characters. Body 2.96–3.27 × 0.83–0.89 mm. Oral sucker 0.26–0.3 mm in diameter. Pharynx ca. 0.16 mm across. Acetabulum prominent, 0.47–0.51 × 0.53–0.55 mm, at anterior part of middle third of body. Testes 0.24–0.37 × 0.21–0.37 mm, posterior one at junction of middle with posterior third of body. Cirrus pouch curved to left, its posterior end extending a little farther backwards than middle of acetabulum. Genital pore on ventral side of left cecum, just in front of posterior limit of anterior third of body. Ovary 0.12–0.21 × 0.18–0.28 mm, to right of median line. Eggs 0.074–0.081 × 0.045–0.055 mm. Vitellaria beginning at level of intestinal bifurcation or frequently at level of genital pore. Excretory vesicle tubular, extending a short distance beyond anterior border of acetabulum.

Habitat. Stomach and intestine of *Lethrinus haematopterus* Temm. et Schl.
Locality and date. Pacific coast of Wakayama Prefecture; July 26, 1926.
Type and paratypes in my collection.

Discussion. The species resembles *H. mutabile* Linton, 1910, so closely that on cursory examination it may readily be confused with the latter species. The following tabular comparison shows their differences.

	H. mutabile Linton, 1910	New species
Body	2.3–3.02 × 0.77–0.94 mm	2.96–3.27 × 0.83–0.89 mm
Oral sucker	0.22–0.24 mm	0.26–0.3 mm
Pharynx	0.08–0.11 mm	0.16 mm
Acetabulum	0.32–0.34 mm	0.47–0.51 × 0.53–0.55 mm
Position of testes	about halfway between acetabulum and posterior end of body or nearer to posterior end.	nearer to acetabulum
Posterior end of cirrus pouch	extending to anterior border of acetabulum or along its right border.	extending farther backwards than middle of acetabulum
Anterior limit of vitellaria	a little in front of intestinal bifurcation.	at level of genital pore or at intestinal bifurcation.
Eggs	0.075 × 0.034 (0.078 × 0.051 in life)	0.074–0.081 × 0.045–0.055
Type host	*Neomoenis griseus*	*Lethrinus haematopterus*



On the basis of the two species described above, I propose to make some additions to the generic diagnosis given by Linton. According to McCoy, who followed out the life history of *Hamacreadium mutabile* Linton, 1910, the young worm obtained experimentally from the intestine of the definitive host has a long tubular vesicle passing forwards in a somewhat sinuous course and terminating in front of the acetabulum. This character of the excretory vesicle which I have confirmed is very important from the taxonomic point of view. The presence of the preoral lip and cervical gland is also characteristic of the genus *Hamacreadium*.

Hamacreadium lethrini Yamaguti, 1934

HOSTS: *Lethrinus hypselopterus* (Lethrinidae), and *Lutjanus gibbus* (Lutjanidae).

HABITAT: Small intestine.

LOCALITY: Puerto Princesa, Palawan Island, Philippines.

SPECIMENS DEPOSITED: USNM Helm. Coll. No. 37894 (one slide with one worm from *L. hypselopterus*), and No. 37895 (two slides with one each from *L. gibbus*).

DESCRIPTION (based on five specimens, four measured): Body 1,870 to 3,080 by 460 to 880; preoral lobe (in three with oral sucker not retracted) 12 to 26; oral sucker 165 to 228 by 179 to 240; acetabulum 245 to 375 by 255 to 385; sucker length ratio 1:1.48 to 1.77; forebody 515 to 1,210, hindbody 885 to 1,500 (includes two with part of hindbody missing); prepharynx length 16 to 63; pharynx 112 to 128 by 114 to 150; esophagus length 97 to 213; testes smooth in younger mature specimen and slightly lobed in fully mature ones; anterior (left) testis 148 to 295 by 133 to 240; posterior testis 179 to 335 by 143 to 265; acetabulum to anterior testis 280 to 390, to posterior testis 365 to 620; posttesticular space, zero to 585; cirrus sac 264 to 550 (longitudinal extent) by 70 to 127; ovary 101 to 310 by 97 to 260; acetabulum to ovary 210 to 255; ovarian lobes two in young mature form and six to eight in fully mature ones; vitellaria commencing postbifurcal, anteriormost margin of vitellaria to acetabulum 225 to 610; genital pore to acetabulum 172 to 460; six older intrauterine eggs 56 to 69 by 39 to 46.

DISCUSSION: Our study was based on one young mature worm from *Lethrinus hypselopterus* (measured) and four fully mature ones from *Lutjanus gibbus* (three measured). Yamaguti (1934) described this species from *Lethrinus haematopterus* from Japan. In one of our specimens the oral sucker was retracted into the body, lying 46 microns posterior to the anteriormost body margin. The acetabular opening is triangular with the apex posteriorly directed, whereas Yamaguti (1934) showed it oval. The posttesticular body was completely missing in one specimen and partly so in another; the lengths in two complete specimens were 555 and 585 microns. The cirrus is protrusible. A short muscular metraterm is present, whereas Yamaguti did not mention one although his figure indicated one. A loop of the uterus extended between the ovary and the anterior testis to the posterior testis in all specimens, whereas Yamaguti did not note this; Manter (1963) indicated a similar variation for *Hamacreadium mutabile* Linton, 1910. The eggs of our specimens were smaller than the 74 to 81 by 45 to 55 listed by Yamaguti.

FROM FISCHTHAL AND KUNTZ, 1964

6. *Plagioporus* (*Plagioporus*) *longivesicula* n. sp. Yamaguti, 1952
Pl. III, Fig. 14.

Habitat. Small intestine of *Lethrinus* sp.

Material and locality. Two gravid and three immature specimens; Macassar.

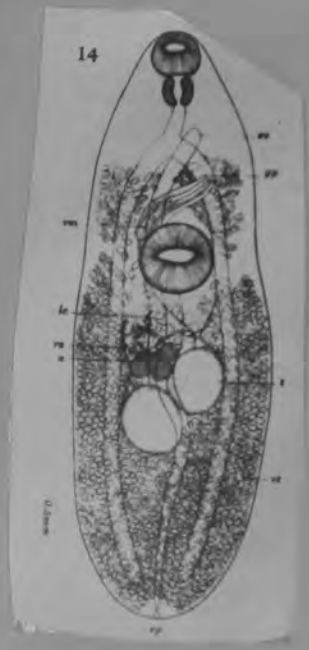
Body spatulate, with blunt anterior and rounded posterior extremity, 3.5 – 4.0 mm long by 1.0 – 1.3 mm wide in ovariotesticular region. Cuticle smooth. Oral sucker subterminal, 0.24 – 0.29 × 0.26 – 0.31 mm; prepharynx very short, with a compact mass of accompanying cells on each side; pharynx 0.125 – 0.16 × 0.15 – 0.2 mm; esophagus 0.2 – 0.25 mm long, bifurcating at about middle of anterior third of body; ceca moderately wide, terminating at posterior extremity. Acetabulum 0.45 – 0.48 mm in diameter, situated at anterior end of middle third of body or at its junction with anterior third.

Testes subglobular, oblique, contiguous, 0.3 – 0.45 × 0.24 – 0.41 mm; right posterior testis situated at junction of posterior two thirds or a little more anteriorly. Cirrus pouch claviform or subcylindrical, 0.62 – 0.67 × 0.11 – 0.13 mm, provided with longitudinal muscle, extending obliquely in front of acetabulum with its posterior end reaching to anterodextral margin of acetabulum. In the paratype, however, it extends on the left of the acetabulum to near the level of its posterior margin. Vesicula seminalis tubular, sigmoid and 60 μ wide in the type, but constricted into two portions in the paratype as in *P. macassarensis*. There is no distinct pars prostatica, though the prostate cells are present. Ductus ejaculatorius tubular, 20 – 30 μ wide; its distal portion everted in the paratype as a smooth cirrus 0.12 mm long by 27 μ wide. Genital pore ventral to left cecum at a postbifurcal level 0.85 – 0.98 mm from anterior extremity.

Ovary 0.22 – 0.24 × 0.26 – 0.35 mm, consisting of a central part and three rounded lobes of nearly the same size, situated in front of posterior testis by right side of anterior testis. Receptaculum seminis oval, 90 μ wide, immediately dextral to ovary in the type; in the paratype, however, it is transversely elongated, about 0.15 mm long, and lies immediately anterodorsal to the ovary, and joins the germiduct at its right end. It tapers anteriorly to a very long winding Laurer's canal which opens on the dorsal surface about 0.12 mm behind the acetabulum. Uterus winding from side to side in intercecal field between anterior testis and acetabulum, finally running along left side of cirrus pouch. Eggs oval, thin-shelled, 66 – 72 μ long; their width is unable to measure on account of shrivelling. Vitellaria forming on each side 8 grape-like bunches of small follicular acini, extending all round ceca from level of genital pore to posterior extremity; the fusiform vitelline reservoir is formed in the type at the beginning of the common vitelline duct; in the paratype, however, it is formed by the dilatation of the distal end of the left vitelline duct.

The long, tubular excretory vesicle extends somewhat sinuously in the median field from its terminal pore as far as the left side of the esophagus; the left collecting vessel arises from the vesicle at the level of the anterior testis, and runs along the dorsal side of the anterior border of this testis, then medial to the left cecum, which it crosses ventrally just behind the metraterm; the right collecting vessel arising at the same level, passes dorsal to the ovary, then medial to the right cecum, which it crosses at the same level as the left one; both terminate at the level of the esophagus or a little more anteriorly.

On cursory examination the present worm which may turn out to be identical with *Plagioporus pallensicus* (Shipley et Hornell, 1905) may be confused with *Plagioporus macassarensis*, but they are quite different in the anterior extent of the excretory vesicle, in the origin of the Laurer's canal and the position of its dorsal opening, in the lobed ovary, etc.



Hamacreadium morgani ~~n. sp.~~ BAZ, 1946

Host *Pargus vulgaris*. — locally called "Morgan" obtained from fisheries of Alexandria.

syn. of *H. mutabile* Opecoelidae

Specific diagnosis : (based on 10 specimens)

A trematode with the characteristics of the genus Hamacreadium Linton 1910 and having :

1— Broadly rounded ends with parallel borders in the postacetabular region and slightly attenuate anteriorly. Unspined.

2— Length 5.7 - 7.3 mm. and breadth 1.764 - 2 mm. at acetabular region or the place of utmost width.

3— Oral sucker 0.318 - 0.424 x 0.471 - 0.518 mm. l.xw.
Prepharynx very short, sometimes completely contracted.

4— Ventral sucker 0.635 - 0.776 x 0.729 - 0.847 mm. l.x w.
mainly in anterior part of middle third of parasite

5— Short and a globular pharynx measuring 0.235-0.353 mm. l.x w.
Esophagus 0.588 - 0.635 long. Ceca simple, end blindly at posterior end.

6— Testes obliquely situated. The left is anterior in position and smaller in size. ovoid, sometimes indented but never lobate. in middle of hind body.

Right testes 0.588 - 0.729 x 0.488 - 0.635 mm.

Left testes 0.471 - 0.612 x 0.518 - 0.612 mm.

6a. Cirrus sac elongate, oblique from right anterior edge of acetabulum to gp.; seminal vesicle in proximal ½; prostatic cells and ejaculatory duct in distal ½. Rarely to mid acet.

7— Ovary lobed (4-6 lobes), wholly in the right side and in front of the right testes. Seminal receptacle well developed, anteroventral to ovary. Uterus pretesticular. Vitellaria lateral from forebody to post. end, sometimes confluent in posttesticular space. May have gap at acet. level.

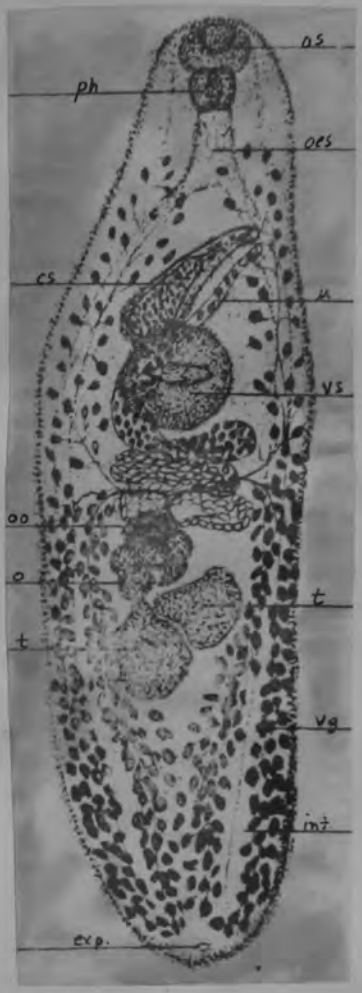
8— Genital pore, lateral and to the left on the ventral surface opposite left cecum at a level midway between its origin and the level of the upper border of the acetabulum.

Discussion :

These parasites with the characteristics of the genus *Hamacreadium* Linton 1910 differ from all recorded species in many respects. The accompanying table shows the difference between them all.

It differs from *H. mutabile* Linton 1910 in size, shape, level of its utmost width, shape of uterus and eggs inside it, position of the genital pore, position of cirrus sac and size of eggs. From *H. gulella* (Linton 1910) in size, shape, position of the genital pore and the vitelline glands which reach the pharynx in *H. gulella* and size of the eggs. From *H. oscitans* (Manter 1940) and *H. mehsena* (Nagaty 1941) in size, position of the cirrus sac, genital pore, size of the eggs, and distribution of vitelline glands, which in these two species lie wholly posterior to the ventral sucker. From *H. consentum* (Linton 1910) it differs in size, shape, position of the genital pore and by the vitelline glands, which reach in these species to the pharynx.

From *H. epinepheli* (Yamaguti 1934) in size, shape, position of the cirrus sac and genital pore, as well as the extension of the vitelline glands to a more anterior level in *H. epinepheli*. From *H. lethrini* (Yamaguti 1934) in size, shape, position of the cirrus sac and genital pore and size of eggs. From *H. interruptus* (Nagaty 1941) in size, position of the cirrus sac, (which in *H. interruptus* lies transversely) and the position of the genital pore (which lies lateral to the left cecum) and in the distribution of the vitelline glands.



Lutjanidae
PAGRUS VULGARIS is PAGRUS PAGRUS L.
Mediterranean; E. European & Atlantic & England; U.S. Atlantic coast occasionally.

This is probably *H. mutabile* acc. Overstreet

The first report of *Hamacreadium* from the Mediterranean

nagatyi Lamothe A., 1963

~~lenthrium~~

~~lethrium~~

Hamacreadium ~~sp. n. lethrini~~ Manter, 1963

? = Hamacreadium interruptus (see Fischthal & Kuntz, 1965)

Genus *Hamacreadium*

H. lethrini sp. n. NAGATY + ABDEL AAL, 1962

(fig. 1)

nec H. lethrini Yamaguti, 1934

Description based on whole mount of single specimen from *Lethrinus mehsenoides* locally called "mehsena." Body elongate, large, 7.22 long by 1.72 wide, anterior end rounded, posterior end with small extending bulbous part; cuticle smooth. Oral sucker terminal, 0.46 by 0.55. Prepharynx short 0.04; pharynx 0.25 by 0.29. Esophagus much elongate, 0.55. Intestinal ceca terminating 0.42 from posterior extremity. Ventral sucker 0.76 in diameter, submedian, in second quarter of body; 1.93 from oral sucker. Ratio of oral to ventral suckers 0.6:1.0.

Testes 2, intercecal, smooth, obliquely situated, anterior testis 0.59 by 0.50, posterior 0.63 by 0.50, in posterior part of third quarter of body. Cirrus pouch 1.02 by 0.17, immediately preacetabular, curved to left and overlapping cecum, widest posteriorly, containing seminal vesicle and protrusible cirrus. Genital opening sinistral, postbifurcal.

Ovary 0.38 by 0.55, with four separate lobes, to right of midline, anterior to posterior testis. Receptaculum seminis small, 0.18 by 0.11, immediately preovarian. Vitellaria composed of small numerous follicles partly extracecal and partly overlapping ceca anteriorly, and extending from level of intestinal bifurcation to posterior extremity, filling posttesticular region. Uterus coiled, occupying area immediately anterior to gonads and extending anterior to acetabulum; metraterm long, to left of cirrus pouch. Eggs oval, averaging 0.075 by 0.030.

Comparisons: This species resembles *H. mutabile* Linton, 1910, but differs from it in having: (1) vitellaria circumcecal, extending anteriorly to level of intestinal bifurcation, and occupying entire body posterior to testes instead of extending to esophageal level anteriorly; and (2) ovary with four separate lobes instead of being compactly lobed.

It also shows some resemblance to *H. interruptus* Nagaty, 1941, but differs from that species in having: (1) a much larger body, (2) a small ventral sucker not occupying most of body width, (3) an oblique rather than transverse cirrus sac, and (4) vitellaria not interrupted.

Hamacreadium lethrini Nagaty and Abdell Aal, 1962 from *Lethrinus mehsenoides* in the Red Sea, is a junior homonym of *H. lethrini* Yamaguti, 1934. In accordance with a request from its authors, it is here renamed *Hamacreadium lenthrium* sp. n. The name *lenthrium* is an anagram of *Lethrinus*.

From Manter, 1963 (issued 28 Feb. 1963)

2

-OVER-

Revisando la bibliografía Nagaty describe en su trabajo de 1962 titulado "Trematodes of fishes from the Red Sea Part. 15 Four new species of *Hamacreadium* Family Allocreadiidae" publicado en el Journal of Parasitology de junio de 1962, una nueva especie de *Hamacreadium* encontrada en *Lethrinus mesenoides* en el Mar Rojo a la cual nombra *lethrini*, siendo que este nombre fue dado primeramente por Yamaguti en 1934, a un parásito encontrado en *Lethrinus haematopterus* de la Costa Pacífica de Wakayama y publicado en el Japanese Journal of Zoology Vol. 5, N° 3, con el nombre de Studies on the Helminth Fauna of Japan II Part. 2 Trematodes of fishes I pp. 308-311. Por lo que se propone para esta nueva especie el nombre de *Hamacreadium nagatyi* n. comb. en honor a nuestro colega del Cairo por su notable labor en el campo de la Helmintología.

FROM LAMOTHE-A. (AN. INST. BIOL. MÉX. 30:102 — issued 6 Feb. 1963)

Hamacreadium nebulosae ~~n. sp.~~ NAGATY AND ABDEL AAL, 1962

(Fig. 2)

LOCALITY: GHARDAGA, RED SEA

Description based on whole mount of three specimens from *Lethrinus nebulosus* locally called 'Sho-ora'. Body large, elongate, 1.83-3.68 long and 0.53-0.98 wide, with numerous dermal gland cells specially in anterior part, slightly tapering anteriorly and broad posteriorly in two specimens; cuticle annulate. Oral sucker 0.18-0.29 by 0.20-0.35, subterminal. Pharynx well developed, 0.11-0.20 in diameter, anterior end slightly overlapped by oral sucker. Esophagus elongate 0.09-0.20 long, surrounded by cells. Intestinal ceca extending near posterior end; terminating at 0.12-0.23 from posterior extremity. Ventral sucker large 0.32-0.56 by 0.20-0.35 overlapping ceca; in second quarter of body length; 0.32-0.62 from oral sucker. Ratio of oral to ventral sucker 0.6:1.

Fig. 2. *Hamacreadium nebulosae* n. sp.

Two testes intercecal, smooth, obliquely situated, anterior testis, the left 0.21-0.24 by 0.17-0.23 and posterior testis, the right 0.24-0.44 by 0.17-0.35, nearly in third quarter of body length. Cirrus sac slightly sinuous, extending to near midlevel of acetabulum and containing vesicula seminalis. Genital pore submedian towards left side, at level of intestinal bifurcation and extracecal.

Ovary intercecal, submedian, towards right side, composed of four lobes measuring 0.11-0.26 by 0.14-0.24, infront of posterior testis and opposite anterior testis nearly in third quarter of body length. Receptaculum seminis could not be seen. Vitellaria composed of small numerous follicles partly extra- and partly intercecal and overlapping ceca, extending posteriorly to near posterior extremity, anteriorly extending from level of intestinal bifurcation or a short distance behind it. Uterus coiled intercecal, extending from level of ovary and anterior testis reaching anteriorly to acetabulum, and may slightly overlapping anterior border of ovary and anterior testis. Eggs large, oval, averaging 0.06 by 0.04. Excretory vesicle tubular extending to near midlevel of acetabulum as can be seen.

Comparisons :

This species resembles *H. interruptus* Nagaty, 1941, but differs from it in having: (1) Vitellaria not constantly interrupted in arrangment; (2) cirrus sac extending nearly to midlevel of acetabulum and is overlapped by it instead of extending transversely anterior to acetabulum and (3) excretory vesicle reaching anteriorly to near midlevel of acetabulum.

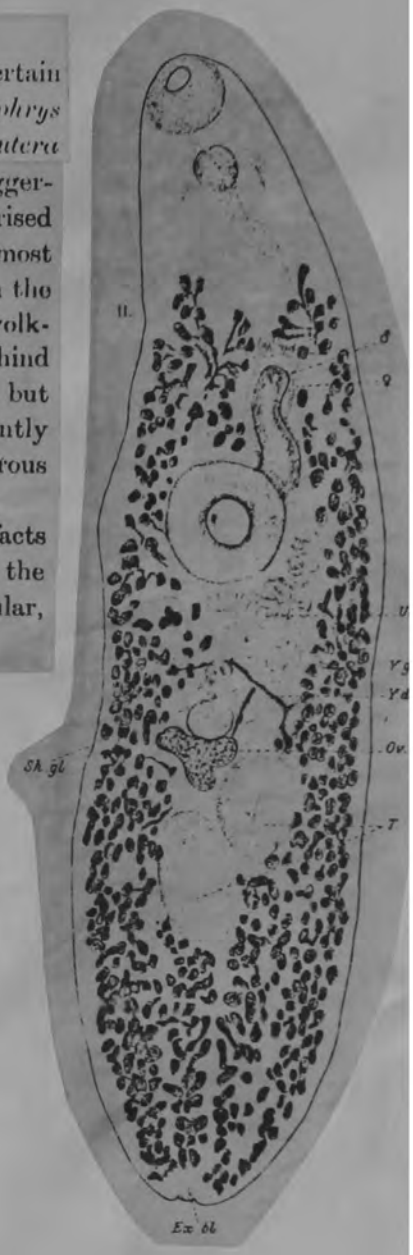
H. nebulosus differs from *H. balistesi* mainly in (1) position of genital opening; (2) extending of cirrus pouch and (3) annulation of the cuticle.

SHIPLEY AND HORNELL, 1905

Distoma palleniscum, ~~n. sp.~~—Plate, fig. 11.

This Trematode comes very near *D. pallens*,† but differs from it in having certain peculiarities which seem of specific rank. *D. pallens* was found in *Chrysophrys aurata*, CUV., by the authors mentioned in the footnote, and by LINTON in *Alutera schæpfii*. The present species is from the intestine of *Balistes* sp., the File- or Trigger-fish found on the Ceylon pearl banks (Plate, fig. 11). The distoma is characterised as follows:—Length 5 millims.; perfectly smooth skin; anterior sucker almost globular, with a relatively small mouth; the pharynx does not directly abut on the anterior sucker; œsophagus wide; digestive cæca reach to posterior end; yolk-glands extraordinarily prominent, arranged in 2 rows, one on each side and behind the testes; the shell glands and receptaculum seminis not easy to distinguish, but they lie anterior to the ovary; the termination of the vas deferens is apparently eversible and is probably used as a penis; a definite penis is absent; numerous glands surround the terminal parts of both the male and the female ducts.

This species seems to differ from the *Distoma pallens* of RUDOLPHI in the facts (i.) that the ventral sucker is not twice the size of the oral, (ii.) the aperture of the ventral sucker is rounded and is not a transverse slit, (iii.) the ovary is not globular, (iv.) the yolk-glands are prominent and arranged in two rows.



HAMACREADIDAE